

**UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK**

CARNEGIE INSTITUTION OF
WASHINGTON and M7D CORPORATION,

Plaintiffs,

v.

PURE GROWN DIAMONDS, INC. and
IIA TECHNOLOGIES PTE. LTD. d/b/a
IIA TECHNOLOGIES,

Defendants.

Case No. 20-cv-189 (JSR)

**DEFENDANTS' RESPONSE TO PLAINTIFFS' STATEMENT
OF MATERIAL FACTS IN SUPPORT OF PLAINTIFFS' OPPOSITION
TO DEFENDANTS' MOTION FOR SUMMARY JUDGMENT**

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Plaintiffs Carnegie Institution of Washington and M7D Corporation opposed a Motion for Summary Judgment filed by Defendants Pure Grown Diamonds, Inc. (“PGD”) and Ila Technologies Pte. Ltd. (“2AT”) on October 28, 2020, and filed a Statement of Materials Facts in support of their opposition. *See* Ps’ LR56.1 Statement, ECF No. 102. Defendants respectfully submit the following responses to Plaintiffs’ purportedly established materials facts.

I. BACKGROUND

1. U.S. Patent No. 6,858,078 (“078 patent”) and U.S. Patent No. RE41,189 (“189 patent”) disclose methods for producing laboratory-grown diamonds. ECF Nos. 97-1, 97-38.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase “methods producing laboratory-grown.”

Disputed in part. U.S. Patent No. 6,858,078 (“078 patent”) discloses a specific method for producing diamond by microwave plasma chemical vapor deposition (MPCVD). ECF No. 97-1, at Abstract; ECF No. 97-3 (*Yan-3*) at 1. U.S. Patent No. RE41,189 (“189 patent”) does not disclose a method for producing “laboratory-grown” diamonds. It discusses a known post-growth treatment of diamond, regardless of its origin. Ex. 58¹ (Gleason Rough Tr.) at 201:15-20, 205:11-206:4, 208:7-11, 213:9-214:4, 214:17-215:12; *see also* ECF No. 104-47 (De Weerd) ¶ 48.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

2. Methods for producing laboratory-grown diamonds include high-pressure, high-temperature (“HPHT”) and chemical vapor deposition (“CVD”). *See* Ex.1 (Expert Report of

¹ Exhibits 58 through 85 are attached to the accompanying Declaration of J. Preston Long.

Michael Capano, Ph.D. Regarding Infringement of U.S. Patent Nos. 6,858,078 and RE41, 189 (“Capano”)) ¶¶ 77, 81.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases “Methods,” “producing,” “laboratory-grown.”

Undisputed that there are various techniques for producing synthetic diamonds by HPHT methods and various techniques for producing synthetic diamonds by CVD.

3. Microwave plasma CVD (“MPCVD”) relies on process controls that manipulate temperature, pressure, and gas-phase chemistry to grow high-quality diamonds. See Ex. 4 (Hemley 9/1/20 Dep.) at 75:18-76:16.

RESPONSE: Defendants object to this proposed fact as ambiguous, vague, and unintelligible, specifically the phrases “process controls,” “manipulate,” and “high-quality diamonds.”

Undisputed that temperature, pressure, and gas-phase chemistry are MPCVD process controls, but disputed that this a complete list of parameters; the growth process is highly variable depending on the particular way the MPCVD process is performed. *See* ECF No. 96 (SOF) ¶¶ 107-110; Ex. 59 (Nebel Reb.) ¶¶ 87-100; Ex. 60 (Hill Dep. Tr.) at 40:7-41:12.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

4. CVD diamonds are grown in a deposition chamber where air is removed and electrodes generate a plasma used to perform chemical vapor deposition. ECF No. 97-1 (’078 patent) at 4:12-21; Ex. 2 (Expert Report of Karen K. Gleason, Ph.D. Regarding Validity of U.S. Patent No. 6,858,078 (“Gleason ’078”)) ¶ 58; Ex. 1 (Capano) ¶ 64.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the terms “air” and “removed.”

Disputed because there are numerous CVD techniques other than MPCVD that do not involve a plasma and/or without removing air. *See, e.g.*, ECF No. 97-20 (*Snail*) at 1:25-30. For example, flame CVD is performed at atmosphere using an oxy-acetylene torch. *See, e.g.*, Ex. 58 (Gleason Rough Tr.) at 148:11-23.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

5. A diamond “seed” is placed in the chamber. ECF No. 97-1 (’078 patent) at 3:65-4:21; 4:56-67; Ex. 2 (Gleason ’078) ¶ 58; Ex. 1 (Capano) ¶ 64.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous as it lacks any context.

Defendants do not dispute that in some CVD techniques, a diamond seed is placed in a chamber.

6. Gases are pumped into the chamber and microwave power is applied, igniting the plasma. Ex. 2 (Gleason ’078) ¶ 58; Ex. 1 (Capano) ¶ 64.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the term “pumped” and generally because the proposed fact lacks any context.

To the extent this fact describes MPCVD generally, Defendants do not dispute that gases are typically provided to a reaction chamber where microwave power is applied to ignite a plasma.

7. Pressure and microwave power are then incrementally increased until growth conditions are reached. Ex. 2 (Gleason '078) ¶ 58; Ex. 1 (Capano) ¶ 64.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases “incrementally increased” and “growth conditions” and generally because the proposed fact lacks any context.

To the extent this fact describes MPCVD generally, Defendants do not dispute that, in some MPCVD processes, pressure and microwave power are increased until a desired pressure and microwave power are achieved.

8. The properties of these laboratory grown diamonds depend on these types of manufacturing process details. Ex. 1 (Capano) ¶¶ 83, 93, 95.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases “[t]he properties,” “laboratory grown,” and “these types of manufacturing process details.”

Undisputed that the material grown during MPCVD processes can function in different ways and produce different results depending on the way in which the MPCVD process is performed. *See, e.g.*, ECF No. 96 (SOF) ¶¶ 107-110; Ex. 59 (Nebel Reb.) ¶¶ 87-100; Ex. 60 (Hill Dep. Tr.) at 40:7-41:12.

9. Lab-grown diamonds may have a single crystal (monocrystalline) or may include many crystals (polycrystalline). Ex. 1 (Capano) ¶¶ 86, 96-100.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase “lab-grown.”

To the extent the proposed fact is intended to describe MPCVD-grown diamonds specifically, Defendants do not dispute that MPCVD-grown diamonds may produce

monocrystalline diamond, polycrystalline diamond, and composites thereof with varying degrees of mono- and polycrystallinity.

10. Monocrystalline diamonds are commonly used as gemstones, while polycrystalline diamonds are typically used in industrial applications. Ex. 1 (Capano) ¶ 101.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the terms “commonly,” “typically,” and “industrial applications.”

Undisputed that diamond gemstones are largely single crystal and both monocrystalline and polycrystalline diamonds can be used for other applications.

A. U.S. Patent No. 6,858,078

11. CVD methods that could produce “small quantities of diamond” were known in the art, but the known processes resulted in slow growth rates. ECF No. 97-1 (’078 patent) at 1:30-51; Ex. 2 (Gleason ’078) ¶ 56; Ex. 1 (Capano) ¶ 62.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the phrases “small quantities of diamonds,” “CVD methods,” “the known processes,” and “slow growth rates.”

Undisputed that the ’078 Patent states: “For at least twenty years, a process of producing small quantities of diamond by chemical vapor deposition (CVD) has been available.” ECF No. 97-1 at 1:30-51. To the extent Plaintiffs imply that there were not already known CVD methods for producing larger diamonds than the examples provided by the ’078 Patent, Defendants dispute that implication. *See, e.g.*, Ex. 61 (*Scarsbrook*) at Abstract; 1:52-56, 4:32-40, 10:53-59; Ex. 62 (*Badzian*) at 352, Fig. 6; Ex. 63 (*Yan* Dissertation) at 49, 51, Fig. 21. To the extent Plaintiffs imply that there were not known CVD methods for producing diamonds at growth rates in excess of 1-3 $\mu\text{m/h}$, Defendants also dispute that implication. *See, e.g.*, Ex. 63 (*Yan* Dissertation) at 42, 47, 51, tbl. 1.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

12. Attempts to grow single-crystal diamond at higher rates were unsuccessful, resulting in, e.g., diamonds that were polycrystalline, had significant defects or stresses. ECF No. 97-1 ('078 patent) at 1:52-61; Ex. 2 (Gleason '078) ¶ 56; Ex. 1 (Capano) ¶ 62.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the terms “unsuccessful” and “significant defects or stresses” and in failing to define whose “[a]ttempts to grow single-crystal diamond at higher rates were “unsuccessful.”

Disputed that no one succeeded in growing single-crystal diamond at higher rates. *See, e.g.*, Ex. 63 (*Yan* Dissertation) at 42, 47, 49, 51, Figs. 17, 21.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

13. The '078 patent's inventors—researchers at the Carnegie Institution of Washington—developed an approach enabling faster growth of substantially single-crystal diamonds (albeit, with a small degree of polycrystallinity). ECF No. 97-1 ('078 patent) at 13:38-14:7; Ex. 2 (Gleason '078) ¶ 57; Ex. 1 (Capano) ¶ 63.

RESPONSE: Defendants object to this proposed fact as constituting a legal conclusion as to inventorship. Defendants further object to this proposed fact as ambiguous and vague, specifically the phrases “faster growth” and “small degree of polycrystallinity.”

It is disputed that the '078 Patents inventors were all researchers at Carnegie Institution of Washington; Dr. Vohra was at the University of Alabama at Birmingham. *See, e.g.*, Ex. 64

(’078 Patent Assignment); ECF No. 97-3 (*Yan-3*) at 1. It is also disputed that Ho-Kwang Mao or Russell J. Hemley contributed to inventorship of the ’078 Patent. Dr. Hemley testified that Carnegie did not possess an MPCVD reactor until after the ’078 Patent was filed. Ex. 67 (Hemley Dep. Tr.) at 124:23-126:7; *see also* ECF No. 97-3 (*Yan-3*) at 1. The proposed fact is further disputed to the extent Plaintiffs imply that the ’078 Patent discloses the invention of any previously known aspects of MPCVD growth, such as the recipe conditions. The ’078 Patent represents a combination of previously published recipe conditions together with a redesigned stage for a Wavemat reactor. ECF No. 97-3 (*Yan-3*) at 1; *see also* ECF No.97-1 at 14:43-49; Ex. 58 (Gleason Rough Tr.) at 27:9-25, 28:15-18, 38:14-20, 47:4-15, 103:19-104:3, 104:18-106:9, 106:18-107:5, 118:12-122:2, 168:12-169:8, 171:20-172:8; Ex. 63 (*Yan* Dissertation) at iii, 8, 35-37, 39-51, tbl. 1. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

14. The ’078 patent discloses ensuring the growth of high-quality, single crystal diamonds by controlling the growth surface temperatures and growth surface temperature gradients. ECF No. 97-1 (’078 patent) at 6:51-54; Ex. 2 (Gleason ’078) ¶ 59; Ex. 1 (Capano) ¶ 65.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the phrase “high-quality.”

Undisputed that the '078 Patent states, "Precise control growth surface temperatures and growth surface temperature gradients prevents the formation of polycrystalline diamond or twins such that a large single crystal diamond can be grown." ECF No. 97-1 ('078 Patent) at 6:51-54.

15. The '078 patent teaches that the temperature of the growth surface of the diamond should be controlled so that all temperature gradients (difference) across the growth surface are less than 20 °C. *See, e.g.*, ECF No. 97-1 ('078 patent) at Claim 1 ("controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20 °C"), Abstract ("controlling temperature of the growth surface such that all temperature gradients across the growth surface are less than 20 °C"), 2:66-3:5 ("a method for producing diamond includes controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20 °C and growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface"), 3:8-13 (same); *see also* Ex. 2 (Gleason '078) ¶¶ 59-61; Ex. 1 (Capano) ¶¶ 65-68.

RESPONSE: Undisputed.

16. The '078 patent explains various parameters for establishing, applying, and adjusting control parameters to ensure the claimed temperature "gradients." *See, e.g.*, ECF No. 97-1 ('078 patent) at 4:59-64, 6:17-25, 12:21-46; Ex. 2 (Gleason '078) ¶¶ 61-62.

The ability to control all of the temperature gradients across the growth surface of the diamond **136** is influenced by several factors, including the heat sinking capability of the stage **124**, the positioning of the top surface of the diamond in the plasma **141**, the uniformity of the plasma **141** that the growth surface of the diamond is subjected to, the quality of thermal transfer from edges of the diamond via the holder or sheath **134** to the stage **124**, the controllability of the microwave power, coolant flow rate, coolant temperature, gas flow rates, reactant flow rate and the detection capabilities of the infrared pyrometer **142**.

ECF No. 97-1 ('078 patent) at 6:55-66; Ex. 2 (Gleason '078) ¶¶ 61-62.

RESPONSE: Defendants object to this proposed fact as vague, unintelligible, and not supported by the cited evidence. Specifically, it is unclear: what the difference is between the “various parameters” and the “control parameters”; which parameters in the quoted text above correspond to the “various parameters” and which correspond to the “control parameters”; or how the ’078 Patent “explains” various parameters for “establishing, applying, and adjusting” the control parameters.

Disputed in part. Undisputed that Plaintiffs have accurately quoted the ’078 Patent. The quoted portion of the ’078 Patent describes states the ability to control temperature gradient depends on “factors.” To that extent Plaintiffs seek to imply that providing a list of factors that can influence the ability to control gradients in the example described in Figure 1 of the ’078 Patent describes *how* to maintain temperature gradients below 20° C. by adjusting those various factors in undisclosed ways, Defendants dispute that implication. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] *see also supra*

Response to ¶ 13. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

17. By using these parameters to control the temperature of a growth surface, the inventors developed a system that could be used with larger seeds while reducing defects, e.g., polycrystallinity and “twinning.” Ex. 2 (Gleason ’078) ¶ 63; ECF No. 97-1 (’078 patent) at 13:21-14:63.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the phrases “these parameters,” “developed a system,” “larger,” “reducing defects.”

Disputed insofar as the cited evidence does not support this proposed fact. Specifically, the cited portion of the '078 Patent does not mention "larger seeds." It states: "Additional process control instrumentation may be particularly useful in experimental settings, in 'scaling up' a process to produce larger diamonds" ECF No. 97-1 ('078 Patent) at 13:61-65. Defendants further dispute that "the inventors" developed a "system." *See supra* Response to ¶ 13.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

18. This allowed the inventors to grow larger single crystal diamond and "large, high quality diamonds with increased growth rates." ECF No. 97-1 ('078 patent) at 13:21-22; Ex. 2 (Gleason '078) ¶ 63.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a "statement of fact" for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms "larger," "increased," and "large."

Disputed in part. Undisputed that the '078 Patent states: "In general, the methods in accordance with exemplary embodiments of the present invention are designed to create large, high-quality diamonds with increased [100] growth rates." ECF No. 97-1 at 13:19-22. Disputed that the '078 Patent represents an invention that "allowed" the growth "large, high quality diamonds with increased growth rates." *See, e.g., supra* Response to ¶ 13; Ex. 61 (*Scarsbrook*) at

Abstract; 1:52-56, 4:32-40, 10:53-59; Ex. 62 (*Badzian*) at 352, Fig. 6; Ex. 63 (*Yan* Dissertation) at 49, 51, Fig. 21.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

19. The '078 patent describes various configurations for use in the claimed methods. For example, some systems use a holder that makes thermal contact with a side surface of the diamond. Ex. 2 (Gleason '078) ¶¶ 88, 138-44, 149-50.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a "statement of fact" for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the phrases "some systems" and "the diamond." None should be considered a "statement of fact" for purposes of summary judgment.

Disputed to the extent Plaintiffs imply the '078 patent describes a system that uses a holder that does not make thermal contact with a side surface of the diamond. It does not. *See generally* ECF No. 97-1 ('078 Patent); *see also* ECF No. 104-2 (Gleason '078) at ¶¶ 368-370; Ex. 58 (Gleason Rough Tr.) at 27:9-25, 28:15-18, 132:25-133:8, 134:1-135:19, 168:12-169:8, 171:20-172:8; Ex. 66 (Lai Dep. Tr.) at 23:3-25:17, 45:3-12; *supra* Response to ¶ 13. There is no indication in the '078 Patent that a flat substrate holder would be able to achieve the claimed gradients. Dr. Yan's 1999 Ph.D. dissertation used the same system and growth conditions as the '078 Patent, except with a flat stage instead of the '078 Patent's redesigned stage. *See supra* Response to ¶ 13; Ex. 63 (*Yan* Dissertation) at 39-47, 49, 51, Figs. 17, 21; ECF No. 97-3 (*Yan-3*)

at 1. [REDACTED]

[REDACTED] This dispute does not create a genuine issue of material fact that the jury needs to resolve.

20. Others use a simple holder, such as a flat plate. Ex. 2 (Gleason '078) ¶¶ 88, 138-44, 149-50.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically “a simple holder.”

Disputed. The '078 patent does not describe a “flat plate.” Plaintiffs’ expert Dr. Gleason [REDACTED]; *supra* Responses to ¶¶ 13, 19. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

21. The '078 patent issued on February 22, 2005, to Russell J. Hemley, Ho-kwang Mao, Chih-shiue Yan and Yogesh K. Vohra. ECF No. 97-1 ('078 patent) at [75].

RESPONSE: Undisputed.

22. The patent contains 64 claims, six of which are asserted in the present litigation (claims 1, 6, 11, 12, 16, and 20). ECF No. 97-1 ('078 patent); Ex. 2 (Gleason '078) ¶ 3.

RESPONSE: Undisputed.

23. The asserted independent claims 1 and 12 of the '078 patent recite:

1. A method for diamond production, comprising:	12. A method for diamond production, comprising:
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<p>controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.; and</p> <p>growing single-crystal diamond by micro-wave plasma chemical vapor deposition on the growth surface at a growth temperature in a deposition chamber having an atmosphere with a pressure of at least 130 torr.</p>	<p>controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.; and</p> <p>growing single-crystal diamond by micro-wave plasma chemical vapor deposition on the growth surface at a temperature of 900–1400° C.</p>
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ECF No. 97-1 ('078 patent) at 14:64-15:4, 15:31-37.

RESPONSE: Undisputed.

B. U.S. Patent No. RE41,189

24. Laboratory-grown diamonds can have flaws limiting their use. ECF No. 97-38 ('189 patent) at 1:14-21, 2:7-9; Ex. 3 (Expert Report of Karen K. Gleason, Ph.D. Regarding Validity of U.S. Patent No. RE41,189 ("Gleason '189")) ¶ 65; Ex. 1 (Capano) ¶¶ 352-53. These flaws may lead to single-crystal and polycrystalline CVD diamonds that "range from opaque to fully transparent," even being "very dark" and "opaque to optical transmission." ECF No. 97-38 ('189 patent) at 1:12-21, 3:19-21; Ex. 3 (Gleason '189) ¶ 65; Ex. 1 (Capano) ¶ 352.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the phrases "laboratory-grown," "flaws," and "limiting their use."

Undisputed that Plaintiffs have accurately quoted the cited reference. Undisputed that a synthetic diamond, like a natural diamond, can have defects that affect its optical properties.

25. While diamond suppliers attempted to improve natural and HPHT diamond properties with "annealing" processes, these processes often resulted in cracks, darkening, and even converting the diamond to graphite. ECF No. 97-38 ('189 patent) at 1:26-32, 2:29-44; Ex. 3 (Gleason '189) ¶ 65; Ex. 1 (Capano) ¶ 353.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the phrases “diamond suppliers,” “attempted,” “properties,” and “often.”

Undisputed that HPHT annealing processes were already known and used to improve optical and other properties of single crystal diamond. Undisputed that, if applied improperly, these annealing processes would, in some instances, result in cracks, darkening, or diamond-graphite conversions. To the extent that Plaintiffs imply that those skilled in the art did not already know how to minimize such occurrences, Defendants dispute that implication. *See, e.g.*, Ex. 67 (*Anthony-4*) ¶¶ [0036]-[0037]; Ex. 68 (*Vagarali-1*) ¶¶ [0033]-[0034]; Ex. 58 (Gleason Rough Tr.) at 201:15-20, 205:11-206:4, 208:7-11, 211:13-212:12, 213:9-214:4, 214:17-215:12.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

26. The ’189 patent describes methods of improving the optical clarity of *single-crystal CVD* diamond (as opposed to natural and HPHT diamond) by subjecting it to HPHT annealing conditions, i.e., certain minimum temperatures and pressures. Applying high pressures and temperatures results in a more perfect diamond crystalline material, (ECF No. 97-38 (’189 patent) at 2:29-50; Ex. 3 (Gleason ’189) ¶ 66; Ex. 1 (Capano) ¶¶ 354-56), and improves the diamond’s optical, electrical, thermal, and mechanical properties, increasing its value. ECF No. 97-38 (’189 patent) at 1:10-12, 1:43-45, 1:61-65, 1:67-2:3, 2:29-34; Ex. 3 (Gleason ’189) ¶ 66; Ex. 1 (Capano ¶¶ 354-56)

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase “more perfect diamond crystalline material.” To the extent that Plaintiffs imply that those skilled in the art did not already know how to improve optical clarity of CVD

diamonds, as compared to HPHT-grown and natural diamond, Defendants dispute that implication. These processes and their resultant effects were already known and generally applicable. *See supra* Response to ¶ 1.

27. The '189 patent is a reissue of U.S. Patent 6,811,610 (“the '610 patent”), filed on June 3, 2002, and issued on November 2, 2004. ECF No. 97-38 ('189 patent) at [64]. The '189 patent, in turn, issued on April 6, 2010, to Wei Li, Russell J. Hemley, Ho-kwang Mao, and Chih-shiue Yan. *Id.* at cover.

RESPONSE: Undisputed.

28. The '189 patent's independent claim 1 recites a method “to improve the optical clarity of CVD diamond where the CVD diamond is single crystal CVD diamond, by raising the CVD diamond to a set temperature of at least 1500° C. and a pressure of at least 4.0 GPA outside of the diamond stable phase.” ECF No. 97-38 ('189 patent) at 4:10-14.

RESPONSE: Undisputed.

C. The Present Litigation and the Court's Claim Constructions

29. PGD sells laboratory grown diamonds manufactured by 2A. ECF No. 47 (Answer) ¶¶ 18-28; Ex. 16 (Carnegie_189_PGD-00008957-975) at 962.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the terms “laboratory grown” and “manufactured.” Defendants further object to this proposed fact as legally irrelevant to Defendants' motion. Disputed. [REDACTED]

[REDACTED] PGD sells diamond gems. *See* Ex. 69 (Williams Tr.) at

92:8-93:3. It is possible that [REDACTED]

[REDACTED]

[REDACTED]

This proposed fact is nevertheless irrelevant to the issues of this motion for summary judgment. The existence of any dispute therein does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

30. In January 2020, Plaintiffs filed suit, alleging willful infringement of the '078 patent and the '189 patent through the manufacture, sale, and importation of diamonds made using the patented processes. *See* ECF No. 1.

RESPONSE: Undisputed that Plaintiffs filed suit in January 2020, alleging direct, induced, and willful infringement of the '078 and '189 Patents through the manufacture, sale, and importation of diamonds. Defendants note that Plaintiffs have not adduced any evidence of willful infringement of either patent or any evidence that 2AT's activities, which are extraterritorial, or PGD's activities provide any basis for infringement.

31. After the Court entered a schedule, ECF No. 26, the parties filed competing *Markman* submissions disputing, among other things, the meaning of the terms "single-crystal diamond" in the '078 patent and "single crystal CVD diamond" in the '189 patent. *See* ECF No. 27-1 (Joint Claim Construction Statement) at 3.

RESPONSE: Undisputed.

32. On May 8, 2020, the Court issued its *Markman* order, construing these terms to mean "a stand alone diamond [made by chemical vapor deposition] having insubstantial non-monocrystalline growth." ECF No. 46 (Opinion and Order) at 27-29.

RESPONSE: Undisputed.

33. In reaching this construction, the Court acknowledged that a stand-alone diamond remains "single crystal" even if containing "small and localized amounts of polycrystallinity or other impurities." ECF No. 46 (Opinion and Order) at 28.

RESPONSE: Undisputed.

34. On September 18, 2020, Plaintiffs offered opening expert reports, including the report of Dr. Michael Capano in support of infringement of the asserted patents (“Capano Report”). Ex. 1 (Capano) cover page, signature page.

RESPONSE: Undisputed. Defendants note, however, that Dr. Capano did not sign his report under oath or penalty of perjury. *See* ECF No. 104-1, at 204-05.

35. On October 9, 2020, Plaintiffs offered rebuttal reports, including the reports of Dr. Karen Gleason regarding the validity of the ’078 patent (Ex. 2 (Gleason ’078), cover page, signature page), and the ’189 patent (Ex. 3 (Gleason ’189), cover page, signature page).

RESPONSE: Undisputed. Defendants note, however, that Dr. Gleason did not sign her reports under oath or penalty of perjury. *See* ECF No. 104-2, at 247-48; ECF No. 104-3, at 81-82.

II. ARGUMENT

A. Infringement of the Asserted Claims of the ’078 Patent Is Disputed.

1. Whether IIA manufactures “single crystal diamond” is disputed.

36. In a December 12, 2014 press release, 2A’s CEO Vishal Mehta was quoted as saying that Defendants manufacture and sell “gem quality, near colorless diamonds of significant carat size.” *See* Ex. 17 (CARN-PGD_00000274) at CARN-PGD_00000281. That same press release notes that the name “2A” is derived from the term for “the purest and rarest diamonds” and states that Defendants’ diamonds are “indistinguishable from mined diamonds, even under a microscope.” *Id.* at CARN-PGD_00000274, CARN-PGD_00000281.

RESPONSE: Defendants object to this proposed fact as factually and legally irrelevant to Defendants’ motion. Disputed insofar as the cited press release does not recite the name “2A.” Disputed that Mr. Mehta’s quote states what the Defendants manufacture and sell. The cited

portion of the press release more accurately states: “CEO Vishal Mehta characterizes Ila Technologies as, ‘A one-of-a-kind, cutting edge company, which, after years of research and development, finally achieved a revolutionary breakthrough - cultivating actual gem quality, near colorless diamonds of significant carat size.’” ECF No. 104-17.

This proposed fact is nevertheless irrelevant to the issues of this motion for summary judgment. The existence of any dispute therein does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

37. Dr. Misra testified that 2A manufactures single crystal diamonds:

Q.

[REDACTED]

■

[REDACTED]

■

[REDACTED]

■

[REDACTED]

■

[REDACTED]

■

[REDACTED]

[REDACTED]

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the term “manufactured.” Disputed that Ex. 7 supports this proposed fact as Ex. 7 does not contain a page 22. Disputed to the extent Plaintiffs imply [REDACTED] [REDACTED]. *See infra* Response to ¶ 46. That fact is not genuinely in dispute. *See id.*

38. A photo of one of IIA’s diamonds is shown on the left in the image below.



Ex. 17 (CARN-PGD_00000274) at CARN-PGD_00000275.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase “IIa’s diamonds.” Defendants object to this proposed fact as legally irrelevant to Defendants’ motion. Disputed insofar as the cited evidence does not support this proposed fact.

This proposed fact is nevertheless irrelevant to the issues of this motion for summary judgment. The existence of any dispute therein does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

39. 2A is PGD’s exclusive supplier for lab-grown diamonds. *Id.* at CARN-PGD_00000279 (“Pure Grown Diamonds are cultivated at its Singapore sister company IIA Technologies’ state of the art facilities...”).

RESPONSE: Disputed. CARN-PGD_0000027 is a 2014 marketing article with branding and marketing type language that fails to support Plaintiffs’ purported fact. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

This proposed fact is nevertheless irrelevant to the issues of this motion for summary judgment. The existence of any dispute therein does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

40. Whether natural or laboratory-grown, no diamond is perfectly pure. Every diamond has some inclusions or blemishes. For example, diamonds may have some degree of polycrystallinity, which occurs when a diamond forms in multiple distinct "grains," each one with its own crystalline orientation. Some may have inclusions, which can include graphite or other forms of carbon, or can even include flaws due to debris from the growth chamber. Ex. 1 (Capano) ¶¶ 96, 99, 110, 116.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases "diamond"—because it is unclear whether the "diamond" being referred to is a rough block or, e.g., a finished diamond—"perfectly pure," "inclusions or blemishes," "some degree of polycrystallinity," "flaws," "debris," and "the growth chamber." Defendants object to this purported statement of fact as not an actual fact but rather a restatement of expert opinion and/or argumentative. That should not be considered a "statement of fact" for purposes of summary judgment. Disputed insofar as the cited evidence does not support this proposed fact. Plaintiffs have only cited an expert opinion that itself does not cite evidence in support of this proposed fact.

The existence of this opinion does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

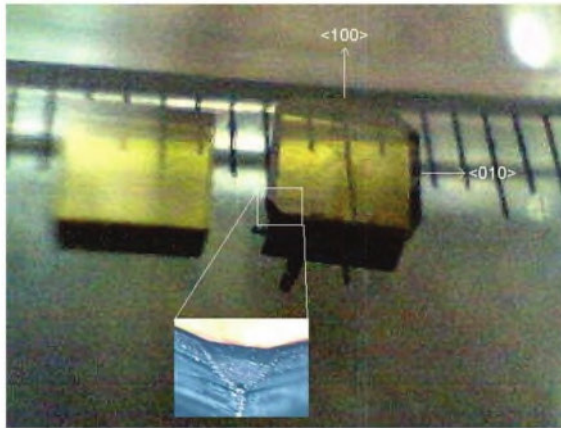
41. The '078 patent teaches that controlling the temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C results in substantially single-crystal diamonds, i.e., with only “a small degree of polycrystallinity.” ECF No. 97-1 ('078 patent) at Abstract, 13:66-14:1.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically “the diamond.” Disputed to the extent Plaintiffs imply that the '078 Patent teaches batch growth of diamonds. The '078 patent teaches that “[p]recise control over growth surface temperatures and growth surface temperature gradients prevents the formation of polycrystalline diamond or twins such that *a* large single crystal diamond can be grown.” ECF No. 97-1 ('078 Patent) at 6:51-54 (emphasis added). It states that the purpose of controlling all temperature gradient across the growth surface below 20° C. is to create a substantially single-crystal diamond (singular) with only a small degree of polycrystallinity. *Id.* at 13:66-14:1 (“[T]he resulting diamond confirmed that *it* was *a* single crystal, with a small degree of polycrystallinity localized at the top edges of the diamond.” (emphasis added)); *see also* ECF 97-3 at Fig. 1.

42. In 2002, a paper by the named inventors of the '078 patent Chih-shiue Yan, Yogesh Vohra, Ho-kwang Mao, and Russell Hemley described a diamond where “considerable spherical diamond-like carbon exists on the edge and corner.... After polishing off the small amount of black diamond-like carbon, which broadens the XRD peak width, our CVD diamond is a single crystal.” ECF No. 97-3 at 12524.

RESPONSE: Undisputed that the quoted language appears in the cited document but incomplete. The full quotation reads: “Moreover, the corner magnification in Fig. 1 shows that considerable spherical diamond-like carbon exists on the edge and corner, but the top edge is sharp and straight. After polishing off the small amount of black diamond-like carbon, which

broadens the XRD peak width, our CVD diamond is a single crystal.” ECF No. 97-3 (*Yan-3*) at 2. Figure 1, to which this passage refers, shown below, illustrates what the authors considered to be “considerable” diamond-like carbon. *Id.* at Fig. 1 (showing the “as grown unpolished CVD diamond and a magnification of CVD-diamond corner”); *see also infra* Response to ¶ 78.



43. During claim construction, Plaintiffs and IIA offered constructions for the term “single-crystal diamond” that allowed for some degree of polycrystallinity. *See* ECF No. 27-1 (Joint Claim Construction Statement) at 3; *see also* ECF No. 46 (Opinion and Order) at 28 (“The parties agree that a ‘single-crystal’ diamond is a stand-alone diamond that has a primarily single-crystal, as opposed to polycrystalline, structure. They also agree that a diamond can still be deemed single-crystal even if it contains small and localized amounts of polycrystallinity or other impurities, such as graphite, twinned diamond, or diamond-like carbon, in its atomic structure.”).

RESPONSE: Undisputed. Defendants note that the Court resolved the parties’ disagreement about “the amount of impurity that is acceptable.” ECF No. 46 (Opinion and Order) at 28.

44. On May 8, 2020, the Court construed the terms “single-crystal diamond” (in the ’078 patent) and “single crystal CVD diamond” (in the ’189 patent) to mean “a stand alone

diamond [made by chemical vapor deposition] having insubstantial non-monocrystalline growth,” acknowledging that a stand-alone diamond remains “single crystal” even if containing “small and localized amounts of polycrystallinity or other impurities.” ECF No. 46 (Opinion and Order) at 27-29.

RESPONSE: Defendants do not dispute that the Court construed the terms “single-crystal diamond” and “single crystal CVD diamond” to mean “a stand alone diamond [made by chemical vapor deposition] having insubstantial non-monocrystalline growth,” or that the claim construction order states the following: “[The parties] also agree that a diamond can still be deemed single-crystal even if it contains small and localized amounts of polycrystallinity or other impurities, such as graphite, twinned diamond, or diamond-like carbon, in its atomic structure.” ECF No. 46 (Opinion and Order) at 27-28.

45. Researchers in the field use experimental techniques known as “X-Ray Diffraction” (“XRD”) and “rocking curve analysis” in order to determine whether a diamond is single crystal. Ex. 1 (Capano) ¶ 88 (“X-ray diffraction is an ideal tool for confirming the existence of a single crystal and characterization its degree of perfection”); *id.* ¶ 237 (rocking curve analysis is used “to assess the quality of the crystal”); Ex. 18 (Vohra) at 80:1-83:5; Ex. 4 (Hemley 9/2/20 Dep.) at 262:22-25.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases “the field” and “single crystal.” Disputed in part. Defendants do not dispute that these techniques can be used to analyze single crystal material that may be present. Disputed that these techniques provide evidence of whether an amalgamation of single crystalline and non-single crystalline material is “stand alone diamond having insubstantial non-monocrystalline growth.” The presence of a substantial amount of non-monocrystalline growth

may be verified visually; more sophisticated techniques are only required to confirm a material is single-crystalline when it otherwise appears to lack substantial non-monocrystalline growth.

ECF No. 96 ¶¶ 70, 71. Named inventor Dr. Vohra testified that x-ray is only needed “when visually you think it’s free.” ECF No. 104-18 at 82:3-13.

Dr. Capano agreed that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

See also [REDACTED]

[REDACTED], [REDACTED]

[REDACTED]

The distinction between the different experimental techniques (i.e., visual, XRD, rocking curve) does not create a genuine issue of material fact that the jury needs to resolve.

46. Plaintiffs' infringement expert Dr. Michael Capano, Ph.D. performed a series of experiments [REDACTED]

Dr. Capano's tests included [REDACTED]
[REDACTED]

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, a restatement of expert opinion and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Defendants further object to this proposed fact as vague and ambiguous, specifically the phrases "series of experiments," [REDACTED]

Disputed in part. Undisputed that Dr. Capano provided [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Dr. Capano testified, [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano testified [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano acknowledged [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano testified [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].

This dispute does not create a genuine issue of material fact that the jury needs to resolve.

The photographs speak for themselves.

47. Dr. Capano applied the Court's construction of the terms "single-crystal diamond" and "single crystal CVD diamond" when conducting his analysis. Ex. 1 (Capano) ¶¶ 226-27.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase "his analysis." Defendants object to this purported statement of fact as not

an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Disputed. Dr. Capano uses the phrase “single crystal diamond” to misconstrue the court’s construction of the “growth surface.”

The Court’s claim construction order reads: “Since the Patent uses the term to refer to the entire surface where hydrocarbon gases are accruing into new diamond, the claim construction must impart the same meaning.” ECF No. 46 (Opinion & Order) at 19. Dr. Capano testified [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]. He further testified [REDACTED]

[REDACTED]

[REDACTED] In addition, Dr. Capano’s opinions regarding [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Plaintiffs’ other expert Dr. Gleason testified [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Gleason testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Dr. Capano again ignored the Court's claim construction, testifying

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Gleason states that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano's decision to disregard the Court's claim construction does not present a genuine issue of material fact for the jury to resolve, but rather it is a legal dispute for the Court to resolve.

48. Dr. Capano explained that "it is impossible to grow a defect free single crystal using MPCVD" and agreed that "the Court's construction captures this well-known concept by acknowledging that it may have 'insubstantial non-monocrystalline growth.'" Ex. 1 (Capano) ¶ 226. Dr. Capano also explained that under to the Court's construction, "a single crystal material is a material where the crystal lattice is continuous and unbroken to the edges with no grain boundaries." *Id.*

RESPONSE: Undisputed that the quoted language appears in the cited document. Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a "statement of fact" for purposes of summary judgment. Defendants dispute that Dr. Capano applied the court's claim construction. *See supra* Response to ¶ 47. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] The Court's claim construction order resolved the parties' disagreement on the "amount of impurity that is acceptable." *See supra* Response to ¶ 47.

Dr. Capano's decision to disregard the Court's claim construction does not present a genuine issue of material fact for the jury to resolve, but rather it is a legal dispute for the Court to resolve.

49. Dr. Capano's characterization of single-crystal material is consistent with how IIA characterized single crystal/monocrystalline in its Opening *Markman* brief. *Id.*; *see also* ECF No. 32 (*Markman Br.*) at 11 ("A single-crystal, or monocrystalline, solid is a material in which the crystal lattice of the entire sample is continuous and unbroken to the edges of the sample, with no grain boundaries.").

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase "how IIA characterized single crystal/monocrystalline in its Opening *Markman* brief." Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a "statement of fact" for purposes of summary judgment.

Disputed. Dr. Capano's characterization is contrary to how Defendants characterized single crystal/monocrystalline in its Opening *Markman* brief. ECF No. 32 (*Markman Br.*) at 11-14. Defendants' brief focused on the amount of acceptable non-monocrystalline material that can be present in the growth. *Id.* And Dr. Capano's report expressly states that [REDACTED]

[REDACTED]

[REDACTED].

Further, as noted in above in response to Paragraph 47, Dr. Capano applies the incorrect construction for the terms "single-crystal diamond" and "growth surface." *See supra* Response to ¶ 47.

Dr. Capano's decision to disregard the Court's claim construction does not present a genuine issue of material fact for the jury to resolve, but rather it is a legal dispute for the Court to resolve.

50. Dr. Capano's experiments "confirm[ed] the [REDACTED]

[REDACTED] Ex. 1 (Capano) ¶ 231.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases [REDACTED]

[REDACTED] Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a "statement of fact" for purposes of summary judgment.

Disputed. As noted above in response to Paragraph 47, Dr. Capano applies the incorrect construction for the terms "single-crystal diamond" and "growth surface." *See supra* Response to ¶ 47. Also disputed as to whether Dr. Capano's experiments show [REDACTED]

[REDACTED]

Dr. Capano's decision to disregard the Court's claim construction does not present a genuine issue of material fact for the jury to resolve, but rather it is a legal dispute for the Court to resolve.

51. In Defendants' process, [REDACTED]

RESPONSE: Defendants object to this proposed fact as unintelligible, specifically the

[REDACTED]

[REDACTED]

52. When the growth process is done, [REDACTED]
[REDACTED] and then further cut and polished such that the resulting diamond can be made into jewelry. *Id.*

RESPONSE: Defendants object that the cited portion of Dr. Capano's report as not factual and it does not cite evidence that supports this proposed fact. Disputed. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

This proposed fact is nevertheless irrelevant to the issues of this motion for summary judgment. The existence of any dispute therein does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

53. Dr. Misra explained that [REDACTED]

[REDACTED]

[REDACTED] Ex. 7 (Misra 8/6/20
Dep.) at 25:8-26:7.

RESPONSE: Undisputed that the quoted language appears in the cited document in the context of Misra's description of [REDACTED].

54. Dr. Capano explained that "it is commonly known in the industry that non-diamond carbon is an [sic] expected to form over the diamond and its holder during the diamond

growth process. Its occurrence does not change the fact that the crystalline structure below is single crystal diamond. Moreover, it is expected that non-diamond carbon will also form at the sides, edges and corners of diamond seeds during the diamond growth process. Its occurrence does not change the fact that the a MPCVD-grown diamond can have the crystalline structure of a ‘single crystal’ diamond even though ‘it is embedded in a polycrystalline diamond’ during the growth process.” Ex. 1 (Capano) ¶ 174.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Undisputed that the quoted language appears in the cited exhibit.

Defendants dispute the implication that whether a rough diamond block is stand-alone diamond having insubstantial non-monocrystalline growth can be assessed by ignoring material other than the embedded single crystal regions. The Court’s claim construction order resolved the parties’ disagreement on the “amount of impurity that is acceptable” in the as-grown diamond. ECF No. 46 (Order and Opinion) at 28; *see supra* Response to ¶ 47. Defendants also dispute whether what is commonly known in the industry has any bearing on the ’078 Patent or its meaning because the modern industry and its processes did not exist at the time the ’078 Patent was filed. [REDACTED]

[REDACTED] *see also* ECF No. 96 (SOF) ¶¶ 113, 115. Regarding the document cited at paragraph 174 of Dr. Capano’s report (189_2AT-00145962-964), [REDACTED]

Dr. Capano's decision to disregard the Court's claim construction does not present a genuine issue of material fact for the jury to resolve, but rather it is a legal dispute for the Court to resolve.

55. Defendants' witnesses testified [REDACTED]

[REDACTED]

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases [REDACTED]."

Disputed that cited Ex. 7 supports this proposed fact as Ex. 7 does not contain a page 151.

[REDACTED]

Mr. Mehta similarly testified [REDACTED]

[REDACTED]

Dr. Misra similarly stated

56. Dr. Misra testified that

Ex. 7 (Misra 8/6/20 Dep.) at 41:1-42:10;

see also id. at 77:12-24, 128:19-129:2.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase [REDACTED].” Disputed. [REDACTED]

57. Dr. Nebel testified that when growing multiple diamonds, some diamonds have fewer defects than others. Ex. 6 (Nebel 10/26/20 (Rough) Dep.) at 12:14-22.

RESPONSE: Undisputed to the extent it is understood Dr. Nebel presented this in the context of his “general experience as an expert growing diamonds.” ECF No. 104-6 at 12:14-22.

58. Dr. Nebel did not see any of the stones that are depicted in Exhibit 24 to Defendants' opening brief in person, and he does not know how those photos were taken or what

the contrast settings on the equipment were. Ex. 6 (Nebel 10/26/20 (Rough) Dep.) at 51:14-19, 53:3-8.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases “the contrast settings” and “the equipment.”

Undisputed that Dr. Nebel testified that he does [REDACTED]
[REDACTED] To the extent Plaintiffs suggest that these photographs are unreliable, Defendants produced these images on July 21, 2020. Plaintiffs had opportunity to examine three different 2AT witnesses about them and declined to do so. Dr. Nebel testified that [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

In addition, Dr. Misra described this phenomenon during his deposition when [REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

59. Dr. Vohra testified that use of x-rays and rocking curve analysis is necessary to show whether a diamond is single-crystal. “[T]o really show that it’s twin free, you really have to use x-rays and get what we call the rocking curve, which will tell you whether you have a mono crystal or if you have more than one crystal. ...we have to do the rocking curve measurements by x-ray technique to show the quality of crystal. Because all of the other visual observations are really qualitative about the crystal quality. It’s really hard with just a visual inspection. I mean, you could tell from the growth steps and the surface appearance. But eventually, you know, to check the crystalline quality, you have to put it on the x-ray machine and tilt it to show that there’s only one grain of diamond. That’s the key.” Ex. 18 (Vohra) at 80:1-83:5.

RESPONSE: Undisputed that Plaintiffs accurately quoted a portion of Dr. Vohra’s testimony. To the extent Plaintiffs intend to imply that visual inspection cannot be used to confirm that a material contains more than an “insubstantial non-monocrystalline growth,” Defendants dispute that implication. *See supra* Response to ¶ 45.

The distinction between different experimental techniques for inspection does not create a genuine issue of material fact that the jury needs to resolve.

60. Dr. Hemley testified that [REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Undisputed that the cited exhibit recites the quoted language in the context of Dr. Hemley’s [REDACTED]

[REDACTED] To the extent Plaintiffs intend to imply that visual inspection cannot be used to confirm

that a material contains more than an “insubstantial” amount of “non-monocrystalline growth.” Defendants dispute that implication. *See supra* Response to ¶ 45.

Dr. Hemley [REDACTED]

[REDACTED] *see also* ECF No. 97-3, at Fig. 1. Hemley further testified [REDACTED]

Dr. Hemley further testified that [REDACTED]

The distinction between different experimental techniques for inspection does not create a genuine issue of material fact that the jury needs to resolve.

61. Dr. Hemley further testified that [REDACTED]

RESPONSE: Undisputed that the cited exhibit recites the quoted language in the context of Dr. Hemley’s testimony about [REDACTED]. To the extent Plaintiffs intend to imply that visual inspection cannot be used to confirm that a material contains more than an “insubstantial” amount of “non-monocrystalline growth.” Defendants dispute that implication. *See supra* Responses to ¶¶ 45, 60.

The distinction between different experimental techniques for inspection does not create a genuine issue of material fact that the jury needs to resolve.

62. Dr. Capano [REDACTED]

[REDACTED] Ex.1 (Capano) ¶ 237.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases [REDACTED]

Disputed in part. Undisputed that Dr. Capano [REDACTED]

[REDACTED] . *See supra* Responses to ¶¶ 45, 46.

The distinction between different experimental techniques for inspection does not create a genuine issue of material fact that the jury needs to resolve.

63. Dr. Nebel testified [REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the terms: [REDACTED] Disputed that Ex. 6 at 62:1-25 supports this proposed fact as Ex. 6 at 62:1-25 does not recite the quoted text. Dr. Nebel testified [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The presence of a substantial amount of non-monocrystalline growth may be verified visually. ECF No. 96 (SOF) at ¶ 70, 71; *see also* Response to ¶ 45.

Dr. Nebel analyzed Capano's [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The distinction between different experimental techniques for inspection does not create a genuine issue of material fact that the jury needs to resolve.

2. Whether IIA “control[s] the temperature of a growth surface such that all temperature gradients are less than 20°C” is disputed.

64. Mr. Ghosh testified [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

A. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Ex. 20 (Ghosh 8/25/2020 Dep.) at 48:21-50:7.

Q. [REDACTED]

[REDACTED]

Id. at 52:2-9.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases [REDACTED]

[REDACTED] Undisputed that the cited exhibit recites a portion of Mr. Ghosh's testimony but incomplete. Mr. Ghosh also testified as follows, which was omitted from the quoted text:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

ECF No. 104-20 (Ghosh) [REDACTED]

65. Dr. Capano performed experiments designed to “investigate 2A asserted temperature and pressure conditions and to explain ... the underlying physical principles active during growth under such conditions,” Ex. 1 (Capano) ¶ 308:

In order to assess the lower pressure growth conditions employed by 2A and their impact on surface temperature gradients and diamond growth, a diamond seed was exposed to conditions more closely matching those 2A uses in its commercial SCP diamond production, [REDACTED] ...the experiment demonstrates uniform diamond growth and the lack of a temperature gradient exceeding 20 °C.

Id. ¶ 320.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases “investigate,” “2A asserted temperature and pressure conditions,” and “more closely matching those 2A uses.” Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Undisputed that the quoted language appears in the cited document.

Defendants dispute the characterization of Dr. Capano’s experiments. Defendants also dispute that Dr. Capano’s experiments at M7D have any relevance or bearing on 2A’s accused process or any other issue in this case. Dr. Capano testified that he did not perform MPCVD growth experiments using the conditions used in 2AT’s accused process. Ex. 71 (Capano Dep. Tr.) at 52:8-12. Dr. Capano testified [REDACTED] Ex. 71 (Capano Dep. Tr.) at 79:12-23. Dr. Capano testified that he “had not seen any documentation regarding Ila’s MPCVD system, its process, its gases or even what recipe it used for commercial production” at the time he performed his MPCVD growth experiments at M7D. Ex. 71 (Capano Dep. Tr.) at 125:23-126:2; *see also* Ex. 79 (Declaration of Capano 10.4.2020) [REDACTED]

[REDACTED]

[REDACTED] Dr. Capano instead chose the experimental parameters for his MPCVD experiments in consultation with an M7D engineer. Ex. 71 (Capano Dep. Tr.) at 55:4-56:15.

Dr. Capano performed Experiment 1 of his notebook [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano's Experiment 2 in his notebook [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano performed Experiment 2 in his notebook [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano performed Experiment 3 of his notebook [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano performed Experiment 6 of his notebook [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano's MPCVD growth experiments lasted, at most, [REDACTED]

[REDACTED] He acknowledged that temperature gradients larger than 20° C. could develop if the growth had continued for longer. Ex. 71 (Capano Dep. Tr.) at 119:3-18. 2AT's growth runs typically last [REDACTED] See ECF No. 104-1 (Capano) ¶ 548.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano relies on [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano equates [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

This dispute does not create a genuine issue of material fact that the jury needs to resolve.

66. Dr. Capano performed a Finite Element Analysis (“FEA”), modeling the heat transfer from the plasma to the diamond, focusing on uniform plasmas like 2A’s, and concluded:

[T]he information obtained from 2A regarding the uniformity of its process, the high thermal conductivity of diamonds, and the FEA discussed above, permit me to conclude that MPCVD diamond growth at 2A using the commercial SCP recipe and process does not occur outside the claimed limitation of a 20 °C temperature gradient.

Id. ¶ 210.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the phrases “heat transfer,” “diamond,” “uniform plasmas like 2A’s.” Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment.

Disputed in part. Undisputed that the quoted language appears in the cited document. Defendants dispute that Dr. Capano’s FEA has any relevance or bearing on 2AT’s accused process or any other issue in this case.

Dr. Capano’s computer model does not simulate 2AT’s accused process or any MPCVD process. ECF No. 96 at ¶¶ 85-90.

Plaintiffs’ other expert Dr. Gleason testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].

Dr. Gleason testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Gleason testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Dr. Capano's FEA takes into account none of that.

Dr. Capano himself testified that [REDACTED]

[REDACTED].

Dr. Capano testified that [REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano's [REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano's [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

In terms of the heat profile Dr. Capano used for his FEA model, Dr. Capano's assumes [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] The *Li* paper examines the plasma properties and temperature

distributions in a simplified configuration [REDACTED] and shows the temperature gradients would be 19° C. on a perfect diamond seed as soon as growth begins. ECF No. 97-25 (*Li*) at 3-6, Figs. 3, 4a. And “when the thickness of the crystal grows and becomes thicker, the plasma density and temperature at the edges and corners will inevitably increase again, which will lead to the decrease of the crystal quality.” *Id.* at 6.

Dr. Capano alleges that [REDACTED]

[REDACTED]

[REDACTED] He concludes that [REDACTED]

[REDACTED]

[REDACTED]. Dr. Capano’s discussion [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Gleason stated [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Gleason described the importance of [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

This dispute does not create a genuine issue of material fact that the jury needs to resolve.

67. 2A has represented that its facility and equipment [REDACTED].

Ex. 31 (May 6, 2020 Ltr. from Long to Fowler).

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase [REDACTED]

Defendants dispute that the cited evidence supports the proposed fact. The cited document states:

[REDACTED]

[REDACTED]

ECF No. 104-31 (May 6, 2020 Ltr. from Long to Fowler). Defendants have long offered to allow Plaintiffs to inspect their facilities provided Plaintiffs allow Defendants to do the same. Ex. 80 (May 8 Letter from J.P. Long to S. Fowler) at 9; *see also* Ex. 81 (Oct. 30, 2020 e-mail from Cecilia). Plaintiffs refused. Ex. 82 (May 14 Letter from S. Fowler to J.P. Long) at 4 n.2.

This proposed fact is irrelevant to the issues of this motion for summary judgment. The existence of any dispute therein does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

68. In his report, Dr. Nebel relies on testing conducted on a variety of IIA's samples. ECF No. 97-12 (Nebel Rep.) ¶¶ 307-321.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase "variety of IIA's samples." Undisputed that Dr. Nebel directed direct testing of temperatures in 2AT's accused commercial process.

69. Dr. Nebel testified about his "temperature gradient test[s]" as follows:

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

Ex. 6 (Nebel 10/25/20 (Rough) Dep.) at 70:21-71:15.

█ [REDACTED]

█ [REDACTED]

█ [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Id. at 124:7-21.

[REDACTED]

[REDACTED]

Id. at 126:14-17.

RESPONSE: Undisputed that the quoted language appears in the cited document.

Defendants note that Dr. Nebel also testified as follows:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

ECF No. 104-6 at 122:21-124:6.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Id. at 125:10-126:13.

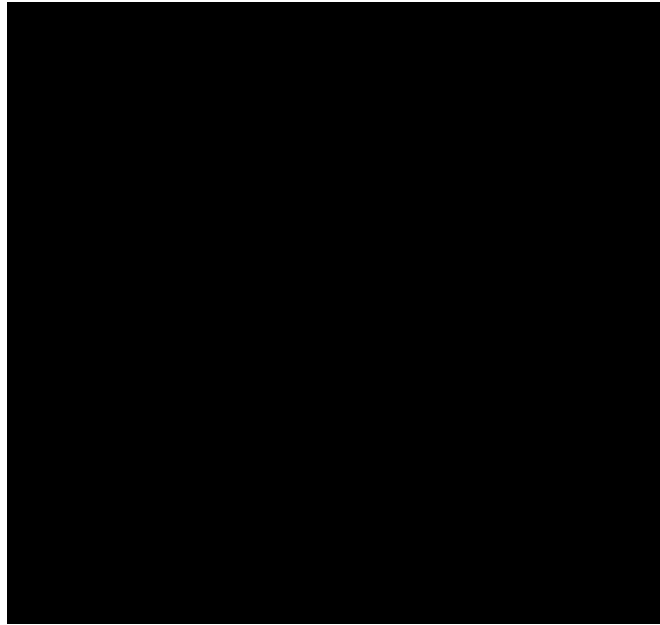
70. In his report, Dr. Nebel states that in order “[t]o understand the actual temperature gradients in 2AT’s accused process, [he] directed a series of experiments conducted during 2AT’s accused process.” ECF No. 97-12 (Nebel Rep.) ¶ 307.

RESPONSE: Undisputed.

71. Dr. Nebel states that [REDACTED]

[REDACTED]

[REDACTED] and provides an example:



ECF No. 97-12 (Nebel Rep.) ¶ 311.

RESPONSE: Undisputed that the quoted language and figure appear in the cited exhibit.

72. Dr. Nebel testified regarding the pyrometer's position during the tests:

After the first few hours of growth, the growth surface becomes rough due to the growth process, and the pyrometer's laser spot becomes difficult to reliably capture with photographs. To ensure the position of each spot can be verified during the experiment, I therefore directed photographs to be taken of the pyrometer coordinates each time a new spot is measured. I also directed a spot position record to be maintained showing the coordinates and position on the growth surface. In addition, I asked that time-stamped video cameras monitor each machine throughout [REDACTED] of experimentation.

ECF No. 97-12 (Nebel Rep.) ¶ 312.

RESPONSE: Undisputed that the quoted language appears in the cited document.

73. Dr. Nebel states that "[i]f a temperature gradient exceeded 20° C., [he] asked that the data be captured":

To assess whether all temperature gradients across the growth surface are less than 20° C., I asked that the pyrometer be used to scan the surface in accordance with the procedure specified by Drs. Hemley, Vohra, and

Walter (discussed above). If a temperature gradient exceeded 20° C., I asked that the data be captured. For each spot measured, a photograph was taken to show the tilt coordinate, a photograph was taken to show the rotation coordinate, a spot position record was made to indicate the position of the spot on the growth surface, and the temperature data was captured in the growth log.

Id. ¶ 315.

RESPONSE: Undisputed that the quoted language appears in the cited document.

74. Dr. Capano explained that in practicing the invention claimed in the '078 patent, “a substrate holder that contacts the side of the growing diamond is not required to maintain a temperature gradient less than 20 °C”:

[216.] In reaching my opinion that a substrate holder that contacts the side of the growing diamond is not required to maintain a temperature gradient less than 20 °C. I took into account of factors in addition to Dr. Vohra’s and Dr. Hemley’s indication that in their laboratory’s substrate holders in the form of a flat plate or surface were in use. I also weighed the fact that the research underlying the patent was conducted as part of a collaboration between two very busy major research laboratories in the field nearly about 20 years ago. In addition, I evaluated a variety of other evidence available to me including: the results of my own experiments, my FEA analysis, the proximity of the seeds and growing diamonds, the presence of growth between and at the periphery of the single crystal diamond being grown on the growth surface, and the results of the experiments I conducted.

[217.] The experiments I conducted, such as Exp-3 described above, it was possible to control the temperature of the growth surface of diamond seeds such that all temperature gradients across the growth surface were less than 20 °C. None of those seeds was located in a holder making thermal contact with the sides of the diamond seed. It was also possible in that experiment to produce temper gradients in excess of 20 °C.

[218.] The FEA analysis described above and in Appendix AA indicates that diamonds growing under conditions of temperature and pressure employed by 2A would not have a surface temperature gradient in excess of 20 °C at the growth surface even in the absence of a holder making thermal contact with the sides of the diamond. The FEA analysis, which was conducted without such a holder, supports those conclusions because in all cases, the heat flux variations needed to sustain temperature gradients of 20 °C or more are not compatible with growing uniform diamond epilayers. Moreover, even transient temperature gradients imposed on the growing diamond dissipated rapidly spreading the thermal energy across the

diamond. Accordingly, the FEA indicates that neither a holder is necessary to limit the growth surface gradient to less than 20 °C, nor are the edge heating effect under conditions employed by 2A in its commercial SCP process sufficient to drive a temperature gradient in excess of 20 °C, particularly on diamonds growing in the middle, as opposed to at the edge of a plotted molly.

Ex. 1 (Capano) ¶¶ 216-218.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase “proximity of the seeds and growing diamonds.” Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Undisputed that the quoted language appears in the cited exhibit. But Dr. Capano provides no evidence regarding the uniformity of 2AT’s rough diamond blocks or any portion thereof. Dr. Capano’s opinions are based on misapplications of the court’s claim construction of the terms “single crystal diamond” and “growth surface.” *See supra* Response to ¶ 47. His opinions are also based on experiments and models that are irrelevant and not supported, as noted above in responses to Paragraphs 65 and 66 (e.g., the FEA does not model an MPCVD growth process and has no relationship whatsoever to the conditions used in 2AT’s (or any other actual MPCVD) process). *See supra* Responses to ¶¶ 65, 66.

As Drs. Vohra’s and Hemley’s use of flat substrate holders, that does not mean they were able to maintain a temperature gradient below 20° C. during those experiments. Dr. Gleason testified [REDACTED]

[REDACTED]; *see supra* Response to ¶¶ 13, 19. And Dr. Gleason described [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Dr. Gleason also testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The existence of this dispute does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

75. Dr. Gleason likewise explained that a side-contact substrate holder was not required to practice the invention claimed in the '078 patent:

The testimony of Dr. Vohra (cited at Nebel R. ¶198) does not establish that the asserted claims of the '078 Patent *require* a side-contact substrate holder. That Dr. Vohra views the substrate holder design as important does not negate the disclosures of the patent regarding the numerous different ways in which the temperature of the growth surface can be controlled such as to maintain all temperature gradients at 20 °C or less. To the extent that Dr. Nebel is suggesting that it is not *possible* to meet the temperature gradient limitations of the asserted claims without a side-contact holder, the FEA performed by Dr. Capano (discussed above) confirmed that "a substrate holder that contacts the side of the growing diamond is not required to maintain a temperature gradient less than 20 °C." Capano R. at ¶220; *see also id.* at ¶¶196-223 & Appendix AA.

Indeed, Dr. Nebel's opinion acknowledges that there are many influences on the temperature of the diamond and the substrate holder that can be affected by varying parameters of the system (which are discussed in the patent). *See* '078 Patent at 6:55-65. For example, Dr. Nebel opines that "diamond MPCVD involves many complex and interdependent electromagnetic, chemical, and thermal processes." Nebel R. at ¶203.

Ex. 2 (Gleason '078) ¶¶ 197-198.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Undisputed that the

quoted language appears in the cited exhibit. The '078 Patent also states that “[t]he ability to control all of the temperature gradients across the growth surface of the diamond is influenced by” nearly a dozen “factors.” ECF No. 97-1 at 6:55-65 (emphasis added). But disputed as to Dr. Capano’s opinions, which are based on experiments and models that are irrelevant and not supported, as noted above in response to Paragraphs 65 and 66 (e.g., the FEA does not model an MPCVD growth process and has no relationship whatsoever to the conditions used in 2AT’s (or any other actual MPCVD) process). *See supra* Responses to ¶¶ 65, 66. Dr. Gleason was also asked at her deposition what parameters are available for an MPCVD operator to adjust other than the factors listed at column 6, lines 55 through 65, of the '078 Patent. Ex. 58 (Gleason Rough Tr.) at 122:14-124:11. Dr. Gleason’s response was that [REDACTED]

[REDACTED] Yet, Dr. Capano’s FEA does not model an MPCVD growth process, much less the conditions used in 2AT’s process. *See supra* Response to ¶ 66.

The existence of this dispute does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

76. Dr. Hemley testified with regards to a “substrate holder” in the context of growing a single diamond:

Q. So when you are growing a single diamond, you would have a -- the diamond -- strike that. When growing a single diamond, you would have the substrate holder directly contacting the side edges of the diamond; is that right?

A. That was one version of it, yes.

Q. Were there any versions that did not contact the sides of the diamond?

A. Pardon?

Q. Were there other versions that did not directly contact the sides of the diamond when you were growing one seed?

A. In some cases we wouldn't have material on the side.

Ex. 4 (Hemley 9/1/20 Dep.) at 56:8-22.

RESPONSE: Undisputed that the quoted language appears in the cited exhibit. Dr

Hemley further testified as follows:

Q. Were there some substrate holder designs that you discovered worked better than others?

A. Yes.

Q. Do you know why those substrate holder designs worked better?

A. Some were better at transporting heat from the diamond.

Q. Some were better at heat-sinking. Is that what you are telling me?

A. Yes.

Q. Were they better for any other reasons?

A. Well, if one were growing multiple diamonds, then there would be a different design.

Q. So there is a difference between growing -- strike that. So there is a difference in substrate holder design when you are growing one diamond versus a substrate holder designed to grow multiple diamonds; is that what you are telling me?

A. Yes.

Q. How are they different.

A. Well, the blocking around the diamond could be different. There could be no blocking; that is, pieces of high-conductivity metal, such as molybdenum, between the diamonds or next to the diamonds.

ECF No. 104-4 at 55:6-56:7.

This proposed fact is nevertheless irrelevant to the issues of this motion for summary judgment. The existence of any dispute therein does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

77. Dr. Hemley testified that "a flat molybdenum stage would provide suitable design for high-power growth on multiple seeds":

Q. So if I understand correctly, you are saying a flat molybdenum stage would provide suitable design for high-power growth on multiple seeds?

A. As I recall, that would work, again, depending on the thickness of the diamond that you want and the quality of the diamond you want.

Id. at 98:8-14.

RESPONSE: Undisputed that the quoted language appears in the cited exhibit, but it is irrelevant to the issues of this motion for summary judgment.

78. The '078 patent discloses a method for growing a diamond with "a small degree of polycrystallinity localized at the top edges of the diamond." ECF No. 97-1 ('078 Patent) at 13:66-14:1.

RESPONSE: Undisputed that Plaintiffs have accurately quoted a portion of the patent.

Defendants note, however, that Dr. Hemley testified that [REDACTED]

[REDACTED]

[REDACTED]; *see also* ECF No. 97-3 (Yan-3) at Fig. 1. Hemley further testified that [REDACTED]

[REDACTED].

79. IIA's position during claim construction was that the '078 patent required (1) measuring two different temperatures on the growth surface, and (2) using the measured temperatures for gradient control. ECF No. 46 (Opinion and Order) at 14-15.

RESPONSE: Undisputed that Plaintiffs have accurately set forth two aspects of Defendants’ positions during the claim construction process, but these positions are irrelevant to the issues of this motion for summary judgment as Defendants apply the Court’s claim constructions. Defendants further note that Dr. Gleason testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

80. The Court found that the claims “refer to ‘all temperature gradients across the growth surface,’ not merely those measured between the middle and the edge.” ECF No. 46 (Opinion and Order) at 15.

RESPONSE: Undisputed that Plaintiffs have correctly quoted the Court’s opinion and order.

81. The Court held that “controlling” should be defined “more broadly” to encompass not only the use of measured temperatures, but a number of “other inputs [that] are also ‘used’ to control the gradients.” ECF No. 46 (Opinion and Order) at 16.

RESPONSE: Undisputed that Plaintiffs have accurately quoted the opinion and order.

82. Dr. Capano testified that temperature “does not have to be directly measured,” and 2A’s CVD chambers “permit control of various other process parameters (e.g., microwave power ...)—by adjusting those parameters, control over temperature can be achieved even though it is never measured.” Ex. 1 (Capano) ¶ 327.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants do not dispute that Plaintiffs have accurately quoted Dr. Capano’s report. But this proposed fact is a conclusory expert opinion that Defendants dispute. The facts are this. The ’078 Patent states that “[t]he ability to control all of the temperature gradients across the growth surface of the diamond is influenced by” nearly a dozen “factors.” ECF No. 97-1 (’078 Patent) at 6:55-65 (emphasis added). *See supra* Response to ¶ 81. But Dr. Gleason testified that [REDACTED]

[REDACTED]

[REDACTED]

The existence of this dispute does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

83. In its claim construction order, the Court recognized that in the beginning “the growth surface is the exterior surface of the diamond seed” which then shifts outward as “hydrocarbon gases accrue onto the seed to form new diamond.” ECF No. 46 (Opinion and Order) at 18-19.

RESPONSE: Defendants do not dispute that Plaintiffs have accurately quoted from the Court’s claim construction Opinion and Order.

84. The Court construed the growth surface to mean “the surface upon which diamond growth is occurring” and made clear that the growth surface is “the entire surface where hydrocarbon gases are accruing into new diamond,” including “localized places” that had “small amounts of polycrystalline diamond.” *Id.* at 18-20.

RESPONSE: Undisputed that Plaintiffs have accurately quoted parts of the Court’s construction of the term “growth surface.” Defendants dispute the way this proposed fact characterizes the construction. The Court’s order reads:

Plaintiffs’ proposed construction . . . would wrongly restrict the term to include only surface area where single-crystal diamond is growing. The Patent notes that, even where its method of growing single-crystal diamond is followed, small amounts of polycrystalline diamond will nonetheless grow in localized places on the diamond. . . . Since the Patent uses the term to refer to the entire surface where hydrocarbon gases are accruing into new diamond, the claim construction must impart the same meaning.

ECF No. 46 (Opinion and Order) at 19.

85. [REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Undisputed.

Defendants further note that Dr. Nebel further testified as follows:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

87. Dr. Nebel testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Undisputed that the quoted language appears in the cited exhibit.

Defendants note, however, that Plaintiffs have quoted only select portions of Dr. Nebel's testimony. *See supra* Response to ¶ 86.

88. Dr. Nebel testified that he understands the term "growth surface" to include the entire surface of the molybdenum substrate holder ("Molly"), where (according to Dr. Nebel) diamond growth is occurring:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Ex. 6 (Nebel 10/26/20 (Rough) Dep.) at 20:25-21:17.

RESPONSE: Plaintiffs accurately quote a select portion of Dr. Nebel's testimony but omit the lead-in question and the initial part of Dr. Nebel's answer. Nowhere in Dr. Nebel's testimony does he assert that any portion of the molly substrate holder is part of the growth surface. Testimony from Dr. Nebel omitted from the incomplete testimony above reads as follows:

[REDACTED]

[REDACTED]

ECF No. 104-6 at 20:13-21:17 (emphasis added).

89. Dr. Misra testified that [REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase [REDACTED] Undisputed that the quoted language appears in the cited exhibit. But Defendants note that Dr. Misra was never asked [REDACTED] [REDACTED] Dr. Nebel, after reviewing Dr. Misra's transcript, asked him what he meant. Dr. Nebel testified:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

ECF No. 104-6 at 12:11-25.

This is consistent with Dr. Misra's understanding as stated in [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]
Plaintiffs' expert Dr. Capano similarly used the term [REDACTED]

[REDACTED]
[REDACTED] *see also supra* Response to ¶ 46.

90. Dr. Misra further testified [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrase [REDACTED] Disputed in part. Undisputed that the quoted language appears in the cited exhibit. But Defendant dispute the characterization of that testimony to the extent Plaintiffs suggest that [REDACTED]

[REDACTED] Dr. Misra's testimony expressly states: [REDACTED]
[REDACTED]

[REDACTED]

[REDACTED] *See supra* Response to ¶ 89.

This dispute does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

91. Dr. Misra testified [REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

RESPONSE: Disputed in part. Undisputed that the quoted language appears in the cited exhibit. Defendants dispute that the above-quoted testimony was provided [REDACTED]

[REDACTED] Dr. Misra continued:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

92. Mr. Mehta [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Undisputed that the quoted language appears in the cited exhibit.

Defendants dispute that the above-quoted testimony was [REDACTED]

[REDACTED]

[REDACTED]

This dispute does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

93. Dr. Nebel testified that he did not perform any testing of the [REDACTED]

[REDACTED]

Have you taken any of those blocks and tested them -- for example, have you tested to see what's the [REDACTED]

A I did not apply more than visual inspection by my eye.

Q Okay, so in your opinion all [REDACTED]
[REDACTED] would be polycrystalline diamonds?

A Indeed, that is my opinion, yes.

Q But you did not test it to determine whether all of it was polycrystalline diamonds.

A I did not characterize these blocks with respect help of sophisticated technical into ex to ^ identify what is going on here. Therefore, I use my eye and distinguish areas which are at least flat from areas which are typically rough by -- induced b--the polycrystalline structure.

Ex. 6 (Nebel (Rough) 10/26/20 Dep.) at 30:2-20.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous “perform,” “test,” [REDACTED] Defendants do not dispute that Plaintiffs have accurately quoted a select portion of Dr. Nebel’s testimony. Defendants further note that Dr. Nebel testified “[T]he optical imaging is basically straightforward. You know, this is not so much sophisticated question here to say there is obviously a mixture of structure coming up.” Ex. 590 (Nebel Final Depo.) 177:3-178:7. The presence of a substantial amount of non-monocrystalline growth may be verified visually. *See supra* Response to ¶ 45. Nebel analyzed Capano’s [REDACTED]
[REDACTED]
[REDACTED]

The distinction between different experimental techniques does not create a genuine issue of material fact that the jury needs to resolve.

94. Dr. Nebel did not perform any tests or experiments to determine what type of material [REDACTED]

Q But you didn't perform any of those tests to determine what type of material is [REDACTED] correct?

A No, I did not do such experiments.

Q So your opinion is solely based on your visual assessment of what's shown in exhibit 80 at page 23 that we're looking at in your exhibit or sorry, in your report?

MR. SHARMA: Objection, form.

BY THE WITNESS: I agree. I had no direct physical availability to this material, therefore, whatever I used is based on evaluation.

Ex. 6 (Nebel 10/26/20 (Rough) Dep.) at 32:1-12.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the phrases "perform," "tests," and [REDACTED] Undisputed that the quoted language appears in the cited exhibit. This proposed fact is nevertheless irrelevant to the issues of this motion for summary judgment. Defendants further note that visual inspection of the rough diamond blocks is sufficient for the purposes of this case. *See supra* Response to ¶ 93.

The distinction between different experimental techniques does not create a genuine issue of material fact that the jury needs to resolve.

95. Despite having "no direct physical availability" to the [REDACTED], Dr. Nebel disagrees with Dr. Misra's characterization [REDACTED]

[REDACTED]":

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].

[REDACTED]

Ex. 6 (Nebel 10/26/20 (Rough)Dep.) at 34:8-20.

RESPONSE: Defendants object to this proposed fact as vague and ambiguous, specifically the terms “characterization,” [REDACTED] Undisputed that the quoted language appears in the cited exhibit. Defendants dispute the characterization of the testimony, which appears to be argument, not fact. Dr. Nebel, whose native language is not English, asked about the meaning of a term Dr. Misra used:

[REDACTED]

ECF No. 104-6 at 12:11-25.; *see also id.* at 9:8.

The existence of this attorney argument does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion

1. Whether IIA infringes the claimed pressure and temperature limitations is disputed.

96. Dr. Capano applied the function, way, result test to determine that growing single crystal diamonds at a pressure [REDACTED] equivalent to growing them at a pressure of 130 torr. Ex. 1 (Capano) ¶¶ 250-62.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Disputed as to whether Dr. Capano applied the correct legal analysis. The function, way, result analysis must be performed in “the context of the patent, the prior art, and the particular circumstances of the case.” *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 610 (1950). Dr. Vohra testified that “if you change one thing in the system, it might affect other things.” ECF No. 96 (SOF) ¶ 107. Plaintiffs’ expert Dr. Gleason, Plaintiff M7D’s CTO (Yarden Tsach), Carnegie’s lab manager (Joe Lai), and the Founder and Director at Plaintiff M7D (Clive Hill) all provided testimony [REDACTED]

[REDACTED]

Dr. Capano’s report states that 2AT grows single-crystal diamond in the same way as the ‘078 Patent because [REDACTED]

[REDACTED]

[REDACTED]. Dr. Capano later testified that [REDACTED] Ex. 71 (Capano Dep. Tr.) at 203:2-12. Dr. Capano also testified that [REDACTED]

[REDACTED] *Id.* at 203:14-204:1.

He acknowledged that he did not analyze any such differences between the way 2AT's MPCVD systems operate and the way the system described in the '078 Patent operates. *Id.* at 204:2-6.

Dr. Capano also misapplied the Court's claim construction of "growth surface" and "single crystal diamond," and his experiments are unnecessary given [REDACTED]

[REDACTED]. *See supra* Response to ¶ 46, 47. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Joseph Lai testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

2AT's process uses [REDACTED]

[REDACTED]

[REDACTED]

There is no genuine dispute as to whether 2AT's process is substantially different from the process the '078 Patent describes and claims. Whether Dr. Capano applied the proper legal analysis does not present a genuine issue of material fact for the jury to resolve. Rather it is a legal dispute for the Court to resolve.

97. Dr. Capano found that 2A's process performs substantially the same function of "growing single crystal diamond" as recited in claim 1. Ex. 1 (Capano) ¶ 251; Ex. 33 (Carnegie_189_2AT-00158057-72) ¶¶ 190-200, 222-33; Ex. 34 (Carnegie_189_2AT-00158235-96) at ¶¶ 19, 29; Ex. 21 (Carnegie_189_2AT-00000286-92); Ex. 22 (Carnegie_189_2AT-00145993-95) at Carnegie_189_2AT_00145995; Ex. 23 (Carnegie_189_2AT-00131651-54); Ex. 19 (Mehta 8/3/20 Dep.) at 100:15-101:1; *Id.* (Mehta 8/4/20 Dep.) at 194:19-195:7, 218:22-19:5.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Disputed in part. Undisputed that this proposed fact accurately states one of Dr. Capano's legal conclusions as stated in his report. Disputed as to whether Dr. Capano performed the correct legal analysis. *See*

supra Response to ¶ 96. This does not present a genuine issue of material fact for the jury to resolve. Rather it is a legal dispute for the Court to resolve.

98. Dr. Capano found when going from a pressure of 130 torr [REDACTED], the operators of 2A's system [REDACTED]
[REDACTED]
[REDACTED] Ex. 1 (Capano) ¶ 252; Ex. 19 (Mehta 8/3/20 Dep.) at 50:16-54:7, 100:5-111:1; Ex. 7 (Misra 8/6/20 Dep.) at 35:23-42:23, 65:7-67:6, 69:6-11, 77:12-14, 86:16-90:1; Ex. 35 (Carnegie_189_2AT-00021242-23340) at Carnegie_189_2AT-00022648, 22782; Ex. 36 (Carnegie_189_2AT-00063465-4614) at Carnegie_189_2AT-00064291; Ex. 24 (CARN-PGD_163707-31) at CARN-PGD_163710-11; Ex. 37 (Carnegie_189_2AT-00157377); Ex. 38 (Carnegie_189_2AT-00145004-5039); Ex. 23 (Carnegie_189_2AT-00131651-54).

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Defendants object to this proposed fact as ambiguous and vague, specifically the phrases [REDACTED]
[REDACTED]

[REDACTED] These objections notwithstanding, the proposed "fact" is disputed in part and legally irrelevant. Undisputed that this proposed fact accurately states one of Dr. Capano's conclusions as stated in his report. Disputed that any facts support such a conclusion. *See supra* Response to ¶ 96. The existence of this dispute is legally irrelevant. Infringement "is determined by comparing an accused pro[cess] . . . with the properly and previously construed claims in suit," not by comparing an accused process with a hypothetical version of the same

process. *SRI Int'l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc).

Further, there is no genuine dispute as to whether 2AT's process is substantially different from the process the '078 Patent describes and claims. *See supra* Response to ¶ 96.

99. Dr. Capano found that to grow diamond [REDACTED] instead of at 130 torr, 2A need only [REDACTED]. Ex. 1 (Capano) ¶ 253.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms "grow diamond" and "uniform." These objections notwithstanding, the proposed "fact" is disputed in part and legally irrelevant. Undisputed that this proposed fact accurately states one of Dr. Capano's conclusions as stated in his report. Disputed that any facts support such a conclusion. *See supra* Response to ¶ 96.

[REDACTED] is a subjective term. Ex. 71 (Capano Dep. Tr.) at 191:1-3; *see also* Ex. 58 (Gleason Rough Tr.) at 28:19-29:7; Ex. 72 (Gleason Fenix Tr.) at 96:5-22. Dr. Capano alleges that 2AT's accused MPCVD process meets the 20° C. temperature gradient feature of the claims because it provides [REDACTED] ECF No. 104-1 (Capano) ¶¶ 187-88, 191, 194-96, 210, 221-22, 253, 287. Dr. Capano testified [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]. Capano concludes that 2AT provides [REDACTED]

[REDACTED]

[REDACTED].

See supra Responses to ¶¶ 65, 66. His observations in that regard are based on his [REDACTED]

[REDACTED]

[REDACTED] *See supra* Response to ¶ 65.

Plaintiffs' other expert, Dr. Gleason, testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The existence of this dispute is thus legally irrelevant. *See supra* Response to ¶ 98.

Further, there is no genuine dispute as to whether 2AT's process substantially differs from the process the '078 Patent describes and claims. *See supra* Response to ¶ 96.

100. All other factors being constant, a pressure of 130 torr will result in a slightly

[REDACTED] plasma ball than at a pressure of [REDACTED]. *Id.*; see Ex. 7 (Misra 8/6/20 Dep.) at 86:16-90:1

[REDACTED]

[REDACTED]).

RESPONSE: Defendants object to this proposed fact as vague, specifically the phrase [REDACTED].” These objections notwithstanding, admitted but irrelevant given the many differences between 2AT's accused process and the process described and claimed in the '078 Patent, including Dr. Capano's need to also change, *inter alia*, 2AT's temperature as part of his DOE opinion. *See supra* Response to ¶ 96.

101. To compensate for a [REDACTED] in pressure from 130 torr [REDACTED], Dr. Capano determined that the operator need only [REDACTED] the size of the plasma ball. Ex. 1 (Capano) ¶ 253.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants object to this proposed fact as ambiguous and vague, specifically the terms [REDACTED] and “the operator.” These objections notwithstanding, the proposed “fact” is disputed in part and legally irrelevant. Undisputed that this proposed fact accurately states one of Dr. Capano’s conclusions as stated in his report. Disputed that any facts support such a conclusion. *See supra* Response to ¶ 96. Dr. Capano’s conclusion is based solely on an assessment of the [REDACTED] expanse of the plasma in [REDACTED].

[REDACTED] *See supra* Response to ¶ 100. The existence of this dispute is legally irrelevant. *See supra* Response to ¶ 98. Further, there is no genuine dispute as to whether 2AT’s process substantially differs from the process the ’078 Patent describes and claims. *See supra* Response to ¶ 96.

102. Dr. Capano found that making an adjustment in power to compensate for a difference of [REDACTED] be minimal and insubstantial. *Id.*

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms “adjustment,” [REDACTED], “minimal,” and “insubstantial.” These objections notwithstanding, the proposed “fact” is disputed in part and legally irrelevant. Undisputed that this proposed fact accurately states one of Dr. Capano’s conclusions as stated in his report. Disputed as to whether Dr. Capano applied the correct legal analysis. *See supra* Response to ¶ 96. Whether Dr. Capano applied the proper legal analysis does

not present a genuine issue of material fact for the jury to resolve. Rather it is a legal dispute for the Court to resolve. Further disputed that any facts support such a conclusion. *See supra* Responses to ¶¶ 96-101. There is no genuine dispute under a proper legal analysis regarding whether 2AT's process substantially differs from the process the '078 Patent describes and claims. *See supra* Response to ¶ 96.

103. 2A provides its operators [REDACTED] Ex. 1 (Capano) ¶¶ 191, 253; *see also* Ex. 8 (Carnegie_189_2AT-00145742-544) at Carnegie_189_2AT-00154742-43 (Steps 1-4); Ex. 7 (Misra 8/6/2020 Dep.) at 104:2-106:18; Ex. 19 (Mehta 8/3/2020 Dep.) at 88:25-89:2; Ex. 19 (Mehta 8/4/2020 Dep.) at 147:4-8, 165:18-167:9; 209:3-212:4; *see also* Ex. 20 (Ghosh 8/25/20 Dep.) at 40:12-43:16.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a restatement of expert opinion, and/or argumentative. Neither should be considered a 'statement of fact' for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms [REDACTED] These objections

notwithstanding, the proposed "fact" is disputed because it is not a fact; it is argumentative. The undisputed facts are as follows. 2AT's process operators can [REDACTED]

[REDACTED]

[REDACTED] The substrate stage of the '078 Patent was "redesigned to sustain a stable and energetic plasma for high growth rate applications at low microwave power (1–2 kW)." ECF No. 97-3 (*Yan-3*) at 1; *see also* ECF No. 97-1 at 14:43-49 (incorporating ECF No. 97-3 (*Yan-3*) by reference). Controlling the temperature of the growth surface over time by adjusting the power was known in the prior art before the

application for the '078 Patent was filed. [REDACTED] ECF No. 97-19 (*Ito*) at 6:6-14, Fig. 5.

104. Dr. Capano discusses a 2016 literature review that lists the various pressures at which different entities grew CVD diamonds. *See* Ex. 1 (Capano) ¶ 254 (discussing CARN-PGD_163707-31 (Ex. 24). Dr. Capano also performed experiments and examined 2A's documents and testimony from its witnesses, and concluded that processes using pressures of [REDACTED] and 130 torr achieve "substantially the same result." Ex. 1 (Capano) ¶¶ 255-261.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms "literature review," "performed," "processes using pressures of [REDACTED] and 130 torr," and "substantially the same result." These objections notwithstanding, the proposed "fact" is undisputed but legally irrelevant. Undisputed that this proposed fact accurately states one of Dr. Capano's conclusions as stated in his report. Legally irrelevant because it contains no discussion of temperature gradients and no comparison between 2AT's accused process and the process described and claimed in the '078 Patent. *See* ECF No. 104-1 ¶¶ 254-61; *supra* Responses to ¶¶ 96, 98.

105. Dr. Capano also applied the function-way-result test to determine that growing diamonds at [REDACTED] is equivalent to growing diamonds at 900 °C. Ex. 1 (Capano) ¶¶ 279-302.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Disputed as to whether

Dr. Capano applied the correct legal analysis. *See supra* Response to ¶ 96. Further, Dr. Capano did not analyze [REDACTED]

[REDACTED] Compare ECF No. 104-1 (Capano) ¶¶ 279-302, with ECF No. 96 (SOF) ¶¶ 50, 51, 62; ECF No. 97-9 at 20. The Court's claim construction order states: "[T]he Court agrees with defendants that plaintiffs' construction wrongly suggests that a method that imposes the specified temperatures and pressures even momentarily would infringe the '078 Patent. Such a construction would be improper" ECF. No. 46 (Opinion & Order) at 22. Additionally, the '078 Patent teaches [REDACTED]

[REDACTED] ECF No. 97-1 ('078 Patent) at 14:34-37; *see also*. ECF No. 96 (SOF) ¶¶ 16, 17, 19, 116, 117. [REDACTED]

[REDACTED] Whether Dr. Capano applied the proper legal analysis does not present a genuine issue of material fact for the jury to resolve. Rather it is a legal dispute for the Court to resolve.

Also disputed as to whether any facts support Dr. Capano's conclusion under a proper legal analysis, as explained *supra* in Defendants' Response to ¶ 96. Further, Dr. Capano's growth experiments [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] There is no genuine dispute as to whether 2A's process is substantially different from the process the '078 Patent describes and claims.

106. Dr. Capano found that 2A's process performs substantially the same function of "growing single crystal diamond" as recited in claim 12. *Id.* ¶ 280.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Disputed in part. Undisputed that this proposed fact accurately states one of Dr. Capano's legal conclusions as stated in his report. Disputed as to whether Dr. Capano performed the correct legal analysis. *See supra* Responses to ¶¶ 96, 105. This does not present a genuine issue of material fact for the jury to resolve. Rather it is a legal dispute for the Court to resolve.

107. 2A grows single crystal diamond at a temperature [REDACTED] *Id.* ¶ 282. 2A controls the temperature of the deposition chamber so that it remains [REDACTED] [REDACTED] *Id.*; *see also* Ex. 19 (Mehta 8/4/20 Dep.) at 207:20-22 ("the overall rule of being [REDACTED] That stands as a general rule."); Ex. 35 (Carnegie_189_2AT-00021242-23340) at Carnegie_189_2AT-00022782 ([REDACTED] Ex. 36

(Carnegie_189_2AT-00063465-64614) at Carnegie_189_2AT-00064291 [REDACTED]
[REDACTED]).

RESPONSE: Disputed in part and legally irrelevant. Undisputed that 2AT's accused process takes place at temperatures [REDACTED]
[REDACTED]. ECF No. 96 (SOF) ¶¶ 49-51.

Disputed that 2AT grows [REDACTED]
[REDACTED]
[REDACTED] 2AT's process is legally irrelevant. *See supra* Response to ¶ 105.

108. [REDACTED]. 1 (Capano) ¶ 283; *see also* Ex. 19 (Mehta 8/4/20 Dep.) at 145:12-146:7.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Defendants object to this proposed fact as ambiguous and vague, specifically the terms [REDACTED]
[REDACTED] These objections notwithstanding, disputed to the extent the proposed fact is intended to comment on [REDACTED]. Paragraph 283 of Dr. Capano's report [REDACTED]

[REDACTED] The '078 Patent provides a 20° C. window for the formation of "smooth, yellow-tint growth" and emphasizes its ability to maintain temperature gradients on the growth surface within 20° C. ECF No. 97-1 ('078 Patent) at 6:48-54, 7:21-23, 11:14-31, 12:23-46, tbl. 1. Undisputed and irrelevant that [REDACTED]
[REDACTED] *See* ECF No. 96 (SOF) ¶¶ 49-51.

109. [REDACTED]

[REDACTED]

[REDACTED] Ex. 1

(Capano) ¶¶ 285-286.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a restatement of expert opinion and/or argumentative. Neither should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms [REDACTED] and [REDACTED]. These objections notwithstanding, the proposed “fact” is disputed in part because it is argumentative, incomplete, and unsupported by factual evidence. *See* ECF No. 104-1 (Capano) ¶¶ 285-286. The undisputed facts are [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] This does not create a genuine issue of material fact that the jury needs to resolve.

110. 2A need only make [REDACTED]

[REDACTED]. Ex. 1 (Capano) ¶

287.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a restatement of expert opinion and/or argumentative. Neither should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms [REDACTED] and [REDACTED]. These objections

notwithstanding, the proposed “fact” is disputed because it is argumentative, unsupported by any evidence relating to 2AT’s process, and based solely on whether [REDACTED]; *supra* Response to ¶¶ 96, 99, 101. Further disputed because Dr. Capano misapplied the Court’s claim construction of “growth surface” *See supra* Response to ¶ 47. There is no genuine dispute as to whether 2AT’s process is substantially different from the process the ’078 Patent describes and claims.

111. 2A’s operators [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Defendants object to this proposed fact as vague, specifically the terms

[REDACTED] These objections notwithstanding, it is undisputed that 2AT’s process operators [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Controlling the temperature of the growth surface over time [REDACTED] was known in the prior art before the application for the ’078 Patent was filed. Ex. 58 (Gleason Rough Tr.) at 168:12-169:8; ECF No. 97-19 (*Ito*) at 6:6-14, Fig. 5. There

is no genuine dispute as to whether 2AT's process is substantially different from the process the '078 Patent describes and claims.

112. To [REDACTED] the temperature from 900 °C [REDACTED] the operator [REDACTED] the

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a restatement of expert opinion and/or argumentative. Neither should be considered a 'statement of fact' for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms "the temperature," "the operator," and "the microwave power." These objections notwithstanding, and assuming it is intended to characterize 2AT's accused process, this proposed "fact" is disputed because it directly contravenes all factual evidence in this case. There is no evidence that 2AT's accused process [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]. There is no genuine dispute as to whether 2AT's process is substantially different from the process the '078 Patent describes and claims.

113. 2A provides its operators w [REDACTED]

[REDACTED].

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a restatement of expert opinion and/or argumentative. Neither should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms [REDACTED].” These objections notwithstanding, the proposed “fact” is disputed because it is not a fact; it is argumentative. The undisputed facts are stated in Defendants’ Response to Paragraph 103 above. There is no genuine dispute as to whether 2AT’s process is substantially different from the process the ’078 Patent describes and claims.

114. An adjustment in power to compensate for a difference [REDACTED] would be minimal and insubstantial. *Id.* ¶ 287 (discussing CARN-PGD_163707-31 (Ex. 24)).

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms “adjustment,” [REDACTED] “minimal,” and “insubstantial.” These objections notwithstanding, the proposed “fact” is disputed because it is argumentative, states a legal conclusion, and Dr. Capano’s report at paragraph 287 does not discuss CARN-PGD_163707-31. The undisputed fact is that [REDACTED]

[REDACTED]

[REDACTED] There is no genuine dispute under a proper legal analysis regarding whether 2AT’s process substantially differs from the process the ’078 Patent describes and claims. *See supra* Responses to ¶¶ 96, 105.

115. Dr. Capano discusses a 2016 literature review that lists the various temperatures at which different entities grew CVD diamonds. *See id.* ¶ 288 (discussing CARN-PGD_163707-31 (Ex. 24)). Dr. Capano also examined results of 2A's own testing, as well as 2A's documents and testimony from its witnesses, and concluded that processes using temperatures of [REDACTED] and 900 °C achieve "substantially the same result." Ex. 1 (Capano) ¶¶ 289-292.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Defendants object to this proposed fact as vague, specifically the terms "literature review," "various temperatures," and "substantially the same result." These objections notwithstanding, the proposed "fact" is undisputed but legally irrelevant. Undisputed that this proposed fact accurately states one of Dr. Capano's conclusions as stated in his report. Legally irrelevant because it contains no discussion of temperature gradients and no comparison between 2AT's accused process and the process described and claimed in the '078 Patent. *See* ECF No. 104-1 (Capano) ¶¶ 254-61; *supra* Responses to ¶¶ 96, 98, 105. When Dr. Capano attempted to perform the process described in the '078 Patent at a temperature of [REDACTED]

[REDACTED] There is no genuine dispute as to whether 2AT's process is substantially different from the process the '078 Patent describes and claims.

116. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

RESPONSE: Defendants object to this proposed fact as vague, specifically the term [REDACTED]

[REDACTED] This objection notwithstanding, undisputed but incomplete. Dr. Misra also testified that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

2. It is disputed whether IIA infringes under the DOE.

117. None of the asserted claims recite, e.g., specific holder configurations, growth chemistries, or oxygen levels. ECF No. 97-1 ('078 patent) at Claims 1, 6, 12, 16, or 20.

RESPONSE: Defendants object to this proposed fact as vague, specifically the term “recite,” “specific holder configurations,” and “oxygen levels.” These objections notwithstanding, undisputed and irrelevant. Undisputed that the asserted claims do not affirmatively contain language reciting substrate stage or holder structures or gas phase chemistries, including oxygen chemistry (the '078 patent specification does affirmatively contain such language). Irrelevant to the doctrine of equivalents analysis, which must be performed in “the context of the patent, the prior art, and the particular circumstances of the case.” *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 610 (1950).

3. Plaintiffs are not precluded from asserting the DOE.

118. The '078 patent claims recite control of the temperature of the growth surface such that the temperature gradients are less than 20° C. ECF No. 97-1 ('078 patent at claim 1, claim 12).

RESPONSE: Defendants object to this proposed fact as vague, specifically the terms “the temperature,” “the growth surface,” and “the temperature gradients.” These objections notwithstanding, undisputed that the asserted claims of the '078 Patent each recite: “controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.” ECF No. 97-1 at 14:65-67, 15:32-24.

119. The '078 patent's specification, in the section titled “Background of the Invention,” briefly discusses CVD and MPCVD processes:

For at least the last twenty years, a process of producing small quantities of diamond by chemical vapor deposition (CVD) has been available. As reported by B. V. Spitsyn et al. in “Vapor Growth of Diamond on Diamond and Other Surfaces,” Journal of Crystal Growth, vol. 52, pp. 219-226, the process involves CVD of diamond on a substrate by using a combination of methane, or another simple hydrocarbon gas, and hydrogen gas at reduced pressures and temperatures of 800-1200° C. The inclusion of hydrogen gas prevents the formation of graphite as the diamond nucleates and grows. Growth rates of up to 1 µm/hour have been reported with this technique.

Subsequent work, for example, that of Kamo et al. as reported in “Diamond Synthesis from Gas Phase in Microwave Plasma,” Journal of Crystal Growth, vol. 62, pp. 642-644, demonstrated the use of Microwave Plasma Chemical Vapor Deposition (MPCVD) to produce diamond at pressures of 1-8 Kpa in temperatures of 800-1000° C. with microwave power of 300-700 W at a frequency of 2.45 GHz. A concentration of 1-3% methane gas was used in the process of Kamo et al. Maximum growth rates of 3 µm/hour have been reported using this MPCVD process.

ECF No. 97-1 ('078 patent at 1:30-51)

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the term “briefly.” This objection notwithstanding, undisputed that this proposed fact appears to quote the ’078 Patent. The ’078 Patent further states:

In the above-described processes, and in a number of more recently reported processes, the growth rates are limited to only a few micrometers per hour. Known higher-growth rate processes only produce or grow polycrystalline forms of diamond. Typically, attempts to produce single-crystal diamond at growth rates higher than about one micrometer per hour result in heavily twinned single crystal diamonds, polycrystalline diamond, or no diamond at all.

ECF No. 97-1 (’078 Patent) at 1:52-59.

120. The ’078 patent’s “Background of the Invention” section concludes by noting that “known processes for growing diamond usually require low pressures of less than 100 torr.” *Id.* at 1:60-61.

RESPONSE: Defendants object to this proposed fact as vague, specifically the term “concludes.” This objection notwithstanding, undisputed that the final sentence of the section titled “Background of the Invention in the ’078 Patent reads, “Further, known processes for growing diamond usually require low pressures of less than 100 torr.” ECF No. 97-1 (’078 Patent) at 1:60-61.

4. Whether IIA infringes under 35 U.S.C. § 271(g) is disputed.

121. The ’078 patent specification states that the diamond grown according to the claimed process may be annealed to change the color. ECF No. 97-1 (’078 Patent 14:40-42 (“The colors of diamond formed by the methods discussed above [can] be changed by annealing. For example, a yellow [or] brown diamond can be annealed into a green diamond.”)); Ex. 25 (De Weerd 10/19/20 Dep.) at 91-19-92:5 (“Q. So you would agree ... that even the inventors of the ’078 patent ... knew that annealing was a step that could be applied after the diamond was grown in order to change its color, right? A. Yes, because they wrote it in the ’078 patent. Q. And that annealing would refer to the same high pressure high temperature treatments that we’ve been

talking about today, right? A. Yes, because it's written like that in the patent. In the '078 patent, I'm sorry.')); ECF No. 97-39 (De Weerdts Rebuttal Rep.) ¶ 74.

RESPONSE: Defendants object to this proposed fact as vague, specifically the term “the diamond grown according to the claimed process.” This objection notwithstanding, undisputed that the '078 Patent states: “The colors of diamond formed by the methods discussed above be changed by annealing. For example, a yellow or brown diamond can be annealed into a green diamond.” ECF No. 97-1 at 14:40-42.

122. The specification of the '078 patent incorporates by reference a paper by the inventors entitled “Very High Growth Rate Chemical Vapor Deposition of Single-Crystal Diamond,” Proceedings of the National Academy of Sciences, Oct. 1. 2002, volume 99, no. 20, pages 12523-12525 (“Yan”). ECF No. 97-1 _('078 Patent) 14:44-49; ECF No. 97-39 (De Weerdts Rebuttal Rep.) ¶ 74.

RESPONSE: Undisputed.

123. Yan reported that “[o]ne promising technique is to use HPHT treatment to fix and enhance cracked, brownish MPCVD diamond to produce colorless material.” ECF No. 97-3 (Yan) at 12525; Ex. (De Weerdts 10/19/20 Dep.) at 92:22-93:3 (“Q. So you would agree that Yan, the reference that was incorporated into the '078 patent, also described HPHT annealing as a typical post-processing step for lab grown diamonds in order to provide color enhancement, right? A. Yes, indeed.”)); ECF No. 97-39 (De Weerdts Rebuttal Rep.) ¶ 74.

RESPONSE: Undisputed.

124. Annealing does not change a diamond's carat, hardness, shape, or size. Ex. 39 (Capano (Rough) Dep.) at 260:24-261:7.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a restatement of expert opinion and/or argumentative. Neither should be considered a ‘statement of fact’ for purposes of summary judgment. Disputed in part. Undisputed that Plaintiffs’ expert Dr. Capano responded to questions by Plaintiffs’ counsel and made statements to this effect. Disputed as to the accuracy of the testimony as a factual matter. Dr. Capano has no experience with HPHT diamond annealing or HPHT annealing of any kind. Ex. 71 (Capano Dep. Tr.) at 30:4-31:14. [REDACTED]

[REDACTED] Plaintiff Carnegie holds several patents that allegedly improve the hardness of CVD-grown diamond. *See, e.g.*, Ex. 84 (U.S. Patent No. 7,115,241 B2) (titled “Ultrahard diamonds and method of making thereof”).

125. Subjecting a diamond to the annealing process of the ’189 Patent still results in a diamond. Ex. 39 (Capano (Rough) Dep.) at 242:11-23 (“The material itself doesn't change. A property of the material is different because of an atomic level of change in the arrangement of atoms, but the diamond is still a diamond. ... So if you take diamond out of the ground and you perform a process on it so that you are cutting and possibly annealing it, it is still a diamond. So there is no -- I wouldn't call it a material change.”).

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a restatement of expert opinion and/or argumentative. Neither should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants further object to this proposed fact as vague, specifically the terms “still results” and “the annealing process of the ’189 Patent.” These objections notwithstanding, undisputed that it is possible to anneal a diamond using certain temperatures above 1500° C. and pressures above 4.0 GPa for a certain amount of time

and still obtain a diamond, including a materially changed diamond. It is also possible to anneal a diamond using certain temperatures above 1500° C. and pressures above 4.0 GPa for a certain amount of time and obtain graphite or a mixture of diamond and graphite. *See* ECF No. 97-38 at 3:3-5; ECF No. 97-7 (Misra Dep. Tr.) at 242:11-243:19, 247:22-248:8.

126. Subjecting CVD diamonds to the annealing process of the '189 Patent does not materially change the diamond. Ex. 39 (Capano (Rough) Dep.) at 18:17-24 (“Q. For the '189 were you able to understand the changes to the diamond that were being described through the annealing process? A. The changes in the annealing process are really not that significant. I wouldn't describe them as a material change as much as I would describe what is happening during the anneal as a rearrangement of atoms from position to position.”); *id.* 242:11-23 (“The material itself doesn't change. A property of the material is different because of an atomic level of change in the arrangement of atoms, but the diamond is still a diamond.... So if you take diamond out of the ground and you perform a process on it so that you are cutting and possibly annealing it, it is still a diamond. So there is no -- I wouldn't call it a material change.”).

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Disputed insofar as the cited evidence does not support this proposed fact. Dr. Capano’s testimony continued:

Q. Okay. Would you agree that it is a substantial change in the optical properties and clarity of the diamond?

A. I would agree that it is a change in the color, and therefore, it has -- there is a change in the value of the material, but the material is still a diamond.

Q. Okay. But you would agree that the change going from opaque to clear is a significant change in the optical properties of that diamond; right?

MS. SIMPSON: Objection; asked and answered.

THE WITNESS: That would be -- that's a change.

BY MR. LONG:

Q. Is it significant?

A. It would be impressive.

...

Q. Is there a difference in value between an opaque diamond and a clear or colorless diamond?

A. There is a value difference.

Q. Is it a significant value difference?

A. It can be. There are other factors involved: The cut, the size, other issues.

Q. Sure. All else being the same, is the price difference between an opaque diamond and a clear or colorless diamond significant?

MS. SIMPSON: Objection; form.

THE WITNESS: It can be significant.

Ex. 71 (Capano Dep. Tr.) at 246:1-247:19.

127. Annealing a diamond by the process described in the '189 patent will still result in a diamond. Ex. 25 (De Weerd 10/19/20 Dep.) at 59:20-60:9 ("Q. [I]f I started with a diamond and performed the type of processing recited in the claims of the '189 patent, could I end with something that is not a diamond? [Objection omitted] A. You will have something that is maybe a small layer of graphite, but it will be, for most part, a diamond. Q. And that's because the repeating arrangement of carbon atoms that we started with, because we started with a diamond, is still present in the resulting diamond, right? A. Yes, that is correct.").

RESPONSE: Defendants object to this proposed fact as vague, specifically the terms "still result" and "the process described in the '189 patent." These objections notwithstanding,

disputed insofar as this proposed “fact” mischaracterizes the testimony it cites as support. Dr. De Weerdts stated: “You will have something that is maybe a small layer of graphite, but it will be, for most part, a diamond.” ECF No. 104-25 at 59:20-60:3; *see also* ECF No. 97-38 at 3:3-5; ECF No. 97-7 (Misra Dep. Tr.) at 242:11-243:19, 247:22-248:8.

128. Dr. De Weerdts testified that 2AT’s annealing process does not cause nitrogen impurities to be removed. Ex. 25 (De Weerdts 10/19/20 Dep.) at 69:4-70:18.

RESPONSE: Defendants object to this proposed fact as vague, specifically the terms “2AT’s annealing process,” “impurities,” and “removed.” These objections notwithstanding, undisputed that Dr. De Weerdts testified: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] ECF No. 104-25 at 69:4-70:18.

129. Dr. De Weerdts could not confirm whether 2A’s annealing process improves the shade, thermal conductivity, or electrical resistance of 2A’s CVD diamonds. Ex. 25 (De Weerdts 10/19/20 Dep.) at 70:19-72:16; *see also id.* at 73:21-75:2, 77:9-78:1.

RESPONSE: Defendants object to this proposed fact as vague, specifically the terms “2A’s annealing process,” “improves,” “shade,” and “2A’s CVD diamonds.” These objections notwithstanding, disputed in part insofar as Dr. De Weerdts testified as follows regarding shade improvements: [REDACTED]

[REDACTED]

[REDACTED] ECF No. 104-25 at 74:5-15; *see also*

ECF No. 97-39. Undisputed that Dr. De Weerdts testified he had not received specific data from

2AT regarding the amount of improvement the optical, thermal, or electrical properties of diamonds subjected to 2AT's HPHT annealing treatment.

130. Dr. De Weerdts opines that “[i]n materials science, ‘annealing’ generally refers to a heat treatment that significantly alters the physical and sometimes chemical properties of a material to improve its properties,” using the example that “annealing is used to harden steel.” ECF No. 97-39 (De Weerdts Rebuttal Rep.) ¶¶ 50-51.

RESPONSE: Undisputed that the proposed fact quotes a portion of Dr. De Weerdts's expert report addressing non-infringement of the '078 Patent.

B. Whether the Asserted Claims of the '078 Patent are Invalid is Disputed.

1. There are disputed issues of fact as to enablement.

131. The asserted claims of the '078 patent do not recite a substrate holder or a specific configuration of a substrate holder. Ex. 2 (Gleason '078) ¶¶ 102-03, 130, 133-36, 208-09; ECF No. 97-1 ('078 patent) at claims 1, 6, 12, 16, & 20 (reciting the claim elements).

RESPONSE: Defendants object to this proposed fact as vague, specifically the term “recite.” This objection notwithstanding, undisputed and irrelevant. Undisputed that the asserted claims do not affirmatively contain language reciting substrate stage or holder structures or configurations. Irrelevant to the written description and enablement analysis.

132. The asserted independent claims of the '078 patent (claims 1 and 12) recite, *inter alia*, “controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.” ECF No. 97-1 ('078 patent) at Claims 1, 12 (reciting the claim elements).

RESPONSE: Undisputed that the quoted language appears in asserted independent claims 1 and 12 of the '078 Patent.

133. The '078 patent provides that one mode of practicing “controlling [the] temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C” involves using a substrate holder that makes thermal contact with the side surfaces of the diamond. Ex. 2 (Gleason '078) ¶¶ 102-03, 130, 133-34, 138-40, 208-09; ECF No. 97-1 ('078 patent) at 2:12-18.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants further object to this proposed fact as vague, specifically the terms “provides,” “one mode,” and “practicing.” Disputed insofar as the '078 Patent describes a geometry in which a temperature gradient could not be assessed. The growth surface of the diamond seed had an area of 3.5 mm x 3.5 mm, and at the end of the growth, the growth surface had an area of 4.2 mm x 4.2 mm. ECF No. 97-1 ('078 Patent) at 13:39-43, 13:57-59; *see also* ECF No. 97-3 (*Yan-3*) at 1-2. The pyrometer had a nominal spot size of 2 mm, but it was provided at an angle of incidence of 65 degrees. ECF No. 97-1 ('078 Patent) at 13:48-51, 13:57-59; *see also* ECF No. 97-3 at 1. In such a geometry, inventor Dr. Vohra testified that “you have really no way to find the maximal or minimal temperature” on the growth surface. Ex. 74 (Vohra Dep. Tr.) at 152:3-7; *see also id.* at 122:8-123:25. He also testified that the temperature gradient in such a geometry is “definitely not accurate” and would be “much too low.” *Id.* at 151:21-152:12.

This proposed fact is nevertheless irrelevant to the issues of this motion for summary judgment. The existence of any dispute therein does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

134. The patent specification also provides a specific example of a substrate holder that, with only minor modifications, would not make thermal contact with the side surfaces. Ex. 2 (Gleason '078) ¶¶ 130-52; ECF No. 97-1 ('078 patent) at 7:5-10 (discussing Figure 2b).

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Defendants further object to this proposed fact as vague, specifically the terms "minor modifications," and "provides." Notwithstanding these objections, disputed. Figure 2b of the '078 Patent expressly includes a sheath 134. ECF No. 97-1 at 7:5-10, Fig. 2b. The '078 Patent explains that "sheath 134 holds the diamond 136 in a stationary position and acts as a heat-sink to prevent the formation of twins or polycrystalline diamond along the edges of the growth surface of the diamond 136." *Id.* at 4:51-55. The '078 Patent does not disclose an embodiment that lacks a substrate holder making thermal contact with the side surfaces of the diamond. *Id.* at 4:51-55, 5:1-10, 5:26-47, 8:5-18, 8:35-40, 9:1-24, 10:60-65, 11:60-12:5, Figs. 1-3, 5-7; *see also* Ex. 58 (Gleason Rough Tr.) at 132:25-133:8; *see also id.* at 134:1-135:19.

Dr. Yogesh K. Vohra, a named inventor of the '078 Patent, testified that temperature gradients are controlled by using a substrate holder that provides heat-sinking to the side surfaces of the diamond. Defs.' Rule 56.1 Statement ¶¶ 102-05. Joseph Lai, a Carnegie lab manager, testified that when he joined Carnegie in late 2005, Carnegie was [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

135. The '078 patent's Figure 2b ("a perspective view of the diamond" and sheath shown in Figure 1) shows diamond 136 in relation to sheath 134. ECF No. 97-1 ('078 patent) at 7:5-6. The figure further depicts "the distance D between the growth surface 137 or top edges 139 of the diamond 136 and an edge 135 of the sheath 134." Ex. 2 (Gleason '078) ¶ 139; ECF No. 97-1 ('078 patent) at 7:8-10.

RESPONSE: Undisputed.

136. A person of ordinary skill in the art would understand that the diamond in the embodiment in Figure 2b can be positioned above the sheath (134), which indicates to a person of skill in the art that a flat plate could easily replace the stage/holder with a sheath. In that instance, the “sheath,” as a flat plate, would touch each of the four side surfaces of the diamond only along the four bottom edges. Ex. 2 (Gleason ’078) ¶¶ 139-40.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants further object to this proposed fact as vague, specifically the terms “easily” and “replace the stage/holder with a sheath.” Notwithstanding these objections, disputed and irrelevant. Disputed insofar as the proposed “fact” is intended to suggest the ’078 Patent enables or describes the capability of maintaining all temperature gradients on the growth surface below 20° C. using a flat substrate holder. *See supra* Responses to ¶¶ 13, 19, 20, 134. Irrelevant insofar as whether one could physically supply a flat plate has no bearing on the ’078 Patent’s disclosures with respect to maintaining all temperature gradients on the growth surface below 20° C. using a flat substrate holder. *See id.*

137. A person of ordinary skill in the art would recognize that a substitution of the sheath in ’078 patent Figure 2b with a flat plate could be made because of the exceptionally high heat conductance of diamond which directs the thermal energy in the diamond essentially directly downward to the cooling substrate. Ex. 2 (Gleason ’078) ¶ 141.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants further object

to this proposed fact as vague, specifically the terms “exceptionally high” and “essentially directly downward.” Notwithstanding these objections, disputed. Factual evidence shows thermal contact to the side surfaces of the diamond was “significantly important” to maintaining temperature gradients in the ’078 Patent. *See supra* Responses to ¶¶ 13, 19, 20, 134.

138. Prior to the filing of the ’078 patent, flat plates had previously been used to hold diamond seeds in MPCVD systems. Ex. 2 (Gleason ’078) ¶¶ 145-48.

RESPONSE: Undisputed and irrelevant insofar as it does not speak to whether the ’078 Patent discloses how to maintain all temperature gradients below 20° C. in such a configuration. *See supra* Responses to ¶¶ 13, 19, 20, 134.

139. A 1994 article (Jubber) discusses an MPCVD system in which “[s]ubstrates are heated on a molybdenum support on top of the platen.” Ex. 26 (Jubber) at 501; Ex. 2 (Gleason ’078) ¶ 145. Jubber illustrates a design in which the substrate is simply sitting atop a flat holder. Ex. 26 (Jubber) at Figure 2; Ex. 2 (Gleason ’078) ¶ 145.

RESPONSE: Undisputed and irrelevant insofar as it does not speak to whether the ’078 Patent discloses how to maintain all temperature gradients below 20° C. in such a configuration. *See supra* Responses to ¶¶ 13, 19, 20, 134.

140. U.S. Patent No. 5,311,103 to Asmussen discloses the use of a flat substrate holder (“susceptor 51” in Figures 1-2). Ex. 27 (Asmussen) at 8:27-28, 9:11, Figs. 1-2; Ex. 2 (Gleason ’078) ¶ 146.

RESPONSE: Defendants object to this proposed fact as vague, specifically the term “flat.” Notwithstanding this objection, disputed and irrelevant. Asmussen discloses a susceptor 51 but does not describe its shape. *See* ECF No. 104-27 at 8:27-28, 9:11, Figs. 1-2. Irrelevant insofar as it does not speak to whether the ’078 Patent discloses how to maintain all temperature

gradients below 20° C. using Asmussen’s susceptor 51. *See supra* Responses to ¶¶ 13, 19, 20, 134.

141. The Saito reference also discloses a flat holder (“base material holder 1” in Figure 10). Ex. 28 (Saito) at 8:42, Fig.10; Ex. 2 (Gleason ’078) ¶ 147.

RESPONSE: Defendants object to this proposed fact as vague, specifically the term “flat.” Notwithstanding this objection, disputed and irrelevant. Saito mentions a “base material holder” but does not describe its shape. *See* ECF No. 97-28 at 8:42, Fig. 10. Irrelevant insofar as it does not speak to whether the ’078 Patent discloses how to maintain all temperature gradients below 20° C. using Saito’s base material holder 1. *See supra* Responses to ¶¶ 13, 19, 20, 134.

142. Dr. Nebel agreed that flat plate holders were known in the 1990s and known to be used with MPCVD systems. Ex. 6 (Nebel 10/25/20 (Rough) Dep.) at 52:23-53:1 (Q. “Were flattened or open substrate holders known in the 1990s to be used with MPCVD systems? A The closed substrate holder came much later on ...); *id* at 53:24-55:2 (e.g., “So the earliest MPCVD systems started out with a flat holder and since then development has occurred on the substrate holder away from flat and open substrate holders. ... A. That appears to me to be the history of the published diamond holders used in the time 1990 to 1999, 2000 ...”). A flat plate holder is also similar to the embodiment shown in Figure 3 of the ’078 Patent, which also shows the grown diamond portion (reference number 140) of the diamond (reference number 136) having sides that are exposed to the plasma (reference number 341). Ex. 2 (Gleason ’078) ¶ 149; ECF No. 97-1 (’078 patent) at Fig. 3.

RESPONSE: Disputed that the cited portions of Dr. Nebel’s testimony support the proposed characterization of his testimony or contain the quoted parenthetical text. Defendants object to the second part of this purported statement of fact as not an actual fact but rather a

conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants further object to the second part of this purported statement of fact as vague, specifically the terms “flat,” “plate holder,” and “similar.” Notwithstanding these objections, disputed and irrelevant. Disputed because factual evidence shows thermal contact to the side surfaces of the diamond was “significantly important” to maintaining temperature gradients in the ’078 Patent. *See supra* Responses to ¶¶ 13, 19, 20, 134. Irrelevant insofar as it does not speak to whether the ’078 Patent discloses how to maintain all temperature gradients below 20° C. using a flat substrate holder design. *See supra* Responses to ¶¶ 13, 19, 20, 134.

143. Provisional Application for the ’078 Patent, Prov. No. 60/331,073 shows at least some exposure of the side surfaces of the diamond. Ex. 2 (Gleason ’078) ¶ 150; Ex. 29 (Provisional Application No. 60/331,073) at Fig. 2.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a ‘statement of fact’ for purposes of summary judgment. Defendants further object to this proposed fact as vague, specifically the terms “at least some,” and “exposure.” Notwithstanding these objections, disputed and irrelevant. Disputed because the quality of Figure 2 in Provisional Application for the ’078 Patent, Prov. No. 60/331,073 is too poor to make such an assessment and because no context for the photograph is provided as it pertains to a growth run. ECF No. 97-28 at Fig. 2. Irrelevant insofar as it does not have any bearing on the issues relevant to summary judgment.

144. In addition to the physical design of the substrate holder, the interactions of that holder with the CVD process conditions described in the '078 patent determine the rate and quality of the deposited diamond. Ex. 2 (Gleason '078) ¶ 152.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Defendants further object to this proposed fact as vague, specifically the terms "interactions of that holder with the CVD process conditions described in the '078 patent," "determine," "rate," "quality," and "deposited diamond." Notwithstanding these objections, undisputed that the geometry of the substrate holder can affect growth rates and (non)crystallinity. *See* Defs.' Rule 56.1 Statement ¶¶ 102-10; EFC No. 97-3 at 1-2 (describing the ability to grow single-crystal diamond and to increase growth rates with the redesigned stage of the '078 Patent).

Dr. Gleason testified, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

145. Implementing a known flat plate configuration in the '078 patent method would be routine for a skilled artisan and would not require undue experimentation. Ex. 2 (Gleason '078) ¶¶ 138-52, 204-05, 208, 214-15.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a 'statement of fact' for purposes of summary judgment. Defendants further object to this proposed fact as vague, specifically the terms "implementing," "known flat plate configuration," "routine," "undue experimentation," and "skilled artisan." Notwithstanding these objections, disputed insofar as the proposed "fact" is intended to suggest the '078 Patent enables or describes the capability of maintaining all temperature gradients on the growth surface below 20° C. using a flat substrate holder. *See supra* Responses to ¶¶ 13, 19, 20, 134, 144. Irrelevant insofar as whether one could physically supply a flat plate has no bearing on the '078 Patent's disclosures with respect to maintaining all temperature gradients on the growth surface below 20° C. using a flat substrate holder. *See id.*

146. Christoph E. Nebel, IIA's expert in this case, is listed as the first-named inventor on United States Patent No. 10,100,433 (the "Nebel '433 Patent"), titled "Substrate Holder, Plasma Reactor and Method for Depositing Diamond," which was filed on November 10, 2015 and issued on October 16, 2018. Ex. 40 (Nebel '433 Patent) at cover; *see also* Ex. 6 (Nebel 10/26/20 (Rough) Dep. at 108:3-25.

RESPONSE: Undisputed and irrelevant.

147. The background section of the Nebel '433 Patent refers to WO 2003/040440 A2, which it describes as a "known method." Ex. 40 (Nebel '433 Patent) at 1:19-20.

RESPONSE: Undisputed that the Nebel '433 Patent states: "The invention relates to a substrate holder having a base plate. The invention also relates to a plasma reactor for depositing diamond, comprising such a substrate holder, and to a method for depositing diamond from the gas phase. Such a method is known from WO 2003/040440 A2. In this known method, a monocrystalline diamond is arranged as a substrate on the base plate of a substrate holder and heated to a temperature of above 900° C. by means of an assigned heating device." ECF No. 104-40 at 1:15-23. Also irrelevant for the reasons stated *infra* in Response to Paragraph 152.

148. WO 2003/040440 A2, titled "Apparatus and Method for Diamond Production, corresponds to PCT/US2002/035659 and lists Russell J. Hemley, Ho-kwang Mao, Chih-shiue Yan, and Yogesh K. Vohra as inventors. Ex. 30 (WO 2003/040440 A2) at cover.

RESPONSE: Undisputed and irrelevant.

149. WO 2003/040440 A2 is the international application corresponding to the '078 patent. *Compare id. with* ECF No. 97-1 ('078 Patent); *see also* Ex. 41 (Nebel Opening Report) ¶¶ 277, 282, 305, 335, 362 (relying on the "EPO Opinion," defined on page "v" as "Patent Cooperation Treaty Written Opinion, International Patent Application No. PCT/US02/35659" in

discussing the disclosures of the '078 patent); Ex. 6 (Nebel 10/26/20 (Rough) Dep. at 109:8-110:1.

RESPONSE: Defendants object to this proposed fact as vague, specifically the term “the international application corresponding to the '078 patent.”

Undisputed and irrelevant that WO 2003/040440 A2 and the '078 Patent both claim priority to U.S. provisional Patent Application No. 60/331,073.

150. The Nebel '433 Patent states that:

Such a method is known from WO 2003/040440 A2. In this known method, a monocrystalline diamond is arranged as a substrate on the base plate of a substrate holder and heated to a temperature of above 900° C. by means of an assigned heating device. Plasma containing hydrogen, nitrogen and methane is ignited above the surface of the substrate. A diamond layer is subsequently deposited on the substrate at a growth rate of 1 to 3 µm/h. The diamond layer deposited from the gas phase grows with the crystal direction predetermined by the substrate, and therefore it is also possible to deposit a monocrystalline diamond layer in the case of a substrate from monocrystalline diamond.

Ex. 40 (Nebel '433 Patent) at 1:19-30.

RESPONSE: Undisputed, incomplete, and irrelevant. The antecedent to the above-quoted language reads: “The invention relates to a substrate holder having a base plate. The invention also relates to a plasma reactor for depositing diamond, comprising such a substrate holder, and to a method for depositing diamond from the gas phase.” ECF No. 104-40 at 1:15-18. Irrelevant for the reasons stated *infra* in Response to Paragraph 152.

151. The Nebel '433 Patent describes WO 2003/040440 A2 as teaching a substrate holder with a base plate, and does not describe such substrate holder as limited to one making thermal contact with the side surfaces of the diamond. *See id.*; *see also* Ex. 6 (Nebel 10/26/20 (Rough) Dep.) at 118:16-23.

RESPONSE: Defendants object to this proposed fact as vague, specifically the terms “describe[s],” “teaching,” and “limited.”

Disputed in part, and irrelevant. Undisputed that the Nebel ’433 Patent does not affirmatively state the substrate holder in WO 2003/040440 A2 is limited to one making thermal contact with the side surfaces of the diamond. Disputed for the reasons stated *infra* in Response to Paragraph 152.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

152. Dr. Nebel admitted in deposition that the Nebel ’433 Patent describes the international application corresponding to the ’078 patent, but does not describe “side walls” as a component of the substrate holder. Ex. 6 (Nebel 10/26/20 (Rough) Dep.) at 110-11; *id.* at 118 (“Please tell me ‘yes’ or ‘no’ does the word ‘Side walls’ appear in the sentence this in known method, a mono crystalline diamond is arranged as a substrate on the base plate of a substrate holder and heated to a temperature of 900-degree C, ‘yes’ or ‘no’? A The. The side walls is not coming up here.”).

RESPONSE: Defendants object to this proposed fact as vague, specifically the terms “describe[s],” “the international application corresponding to the ’078 patent,” and “component of the substrate holder.”

Disputed in part, incomplete, and irrelevant. Undisputed that Dr. Nebel testified the specific portion of the Nebel ’433 Patent he was asked about does not expressly contain the words “side walls.” Disputed because that portion of the Nebel ’433 Patent does not address any requirement that all temperature gradients across a diamond’s growth surface must be maintained

less than 20° C. Incomplete because Dr. Nebel also testified, “As it is referring to the patent explicitly it must have side wall holder because we --” before being cut off by the questioner. ECF No. 104-6 at 110:23-111:16. He further testified “It is correct that the side walls holder is not mentioned explicitly but the patent at the time percentage was directly indicating that you need to take a said cooling system to make this experiment running. So the reference was given to say if you want to do that, look into the patent and then you will end up with the side walls cooling substrate holder as a device.” *Id.* at 111:17-112:4. Further disputed because the Nebel ’433 Patent impliedly remarks on the fact the substrate holder in WO 2003/040440 A2 is limited to one making thermal contact with the side surfaces of the diamond. The Nebel ’433 Patent is directed to a special substrate holder design that “serves for avoiding a thermal contact between the substrates 5 and the cover plate 4, and therefore there are no undesired thermal losses.” ECF No. 104-40 at 5:56-59; *see also id.* at 4:64-7:33, Figs. 1-5. The Nebel ’433 Patent distinguishes WO 2003/040440 A2 as a known example of disclosing a way of arranging a diamond “on the baseplate of a substrate holder.” *Id.* at 1:15-30.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

153. The Nebel ’433 Patent describes WO 2003/040440 A2 as including temperatures above 900 °C (which would include temperatures between 900-1000 °C) without reference to oxygen. Ex. 40 (Nebel ’433 Patent) at 1:19-30.

RESPONSE: Defendants object to this proposed fact as vague, specifically the terms “including,” “include,” and “without reference to.”

Undisputed and irrelevant.

154. Referring to the method of WO 2003/040440 A2, the Nebel '433 Patent further states that:

However, this known method has the drawback that individual substrates from monocrystalline diamond only have a small size. In order to efficiently carry out the method, the base plate of the substrate holder can be equipped with a plurality of substrates which can be coated at the same time. However, the drawback is that these individual substrates are then interconnected by a polycrystalline diamond layer deposited from the gas phase. Thereafter, the individual substrates must be separated upon conclusion of the growth process, e.g. by being removed using the laser cutting method. This damages the substrate holder, and therefore a new substrate holder always has to be provided for the repeated conduction of the method.

Id. 1:31-43.

RESPONSE: Defendants object to this proposed fact as vague, specifically the term “referring to.”

Disputed in part and irrelevant. Undisputed that the proposed fact correctly quotes a portion of the Nebel '433 Patent. Disputed that the quoted text refers to WO 2003/040440 A2, which is cited as only one example of “a method for depositing diamond from the gas phase.” ECF No. 104-40 at 1:15-18; *see also supra* Response to ¶ 152. When asked to acknowledge “that the '078 Patent uses or can grow multiple substrates or seeds at a single time,” Dr. Nebel testified, “Quite the contrary.” ECF No. 104-6 at 119:1-120:17. “No. No, I don’t agree to that.”

Id. Irrelevant to the extent the proposed fact seeks to imply a connection between the 20° C. temperature gradient limitation recited in the claims of the '078 Patent and the Nebel '433 Patent. *See generally* ECF No. 104-40.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

155. The Nebel '433 Patent describes WO 2003/040440 as having as a drawback when using multiple seeds that the individual substrates are interconnected by a polycrystalline diamond layer that must be separated. *See id.*; *see also* Ex. 6 (Nebel 10/26/20 (Rough) Dep.) at 119:1-8, 125:16-127:1.

RESPONSE: Defendants object to this proposed fact as vague, specifically the terms “describes” and “when using multiple seeds.” Defendants further object that the cited support for this proposed fact does not support the proposition for which it is cited.

Disputed and irrelevant for the reasons stated in response to Paragraph ¶ 154.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

156. In the '078 patent, the position of the substrate holder in relationship to the side surfaces of the diamond is one of a number of factors identified by the specification as impacting the ability to “control[] the temperatures of the growth surface such that all the temperature gradients across the growth surface of the diamond are less than or equal to 20° C.” ECF No. 97-1 ('078 patent) at 6:48-51; Ex. 2 (Gleason '078) ¶¶ 153-93.

RESPONSE: Undisputed and irrelevant. Plaintiffs’ expert Dr. Gleason testified that this

[REDACTED]

[REDACTED]

[REDACTED] *see also supra* Responses to ¶ 13, 16.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

157. A person of ordinary skill in the art would have understood at the time the '078 patent was filed how to use the various factors detailed in the patent regardless of whether the holder makes thermal contact with the side surfaces. Ex. 2 (Gleason '078 Rep.) ¶¶ 195, 198, 201, 206, 209, 211-12, 215-17, 218-20, 222.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “person of ordinary skill in the art,” “various factors detailed in the patent,” “use,” and “side surfaces.”

Undisputed and irrelevant. Undisputed that known MPCVD processes in the prior art used different substrate holder designs compared to the designs disclosed by the '078 Patent. Irrelevant because the proposed fact states nothing about the ability to control all temperature gradients on the growth surface so they remain below 20° C., as recited in the asserted claims.

158. A POSA would have understood that the inventors were in possession of using these combined factors to achieve the claimed temperature gradients. Ex. 2 (Gleason '078 Rep.) ¶¶ 88, 194-201.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “POSA,” “using,” “these combined factors,” and “achieve.”

Disputed for at least the reasons stated in response to Paragraphs 3, 13, and 16 above. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

159. It was within routine knowledge of a person of ordinary skill in the art to at the time of the invention to adjust the factors identified by the specification as impacting the ability to “control[] [the] temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.” Ex. 2 (Gleason ’078 Rep.) ¶¶ 195, 198, 201, 206, 209, 211-12, 215-17, 218-20, 222.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “routine knowledge,” “person of ordinary skill in the art,” “these combined factors,” and “adjust.”

Undisputed and irrelevant. Undisputed that those skilled in performing MPCVD diamond growth knew how to change the factors identified in column 6, lines 55-65, of the ’078 Patent.

Those factors are [REDACTED]

[REDACTED]:11; *see also supra* Response to ¶ 13.

Irrelevant because the proposed fact states nothing about whether a person of ordinary skill in the art would have known ways other than the specific ones described in the ’078 Patent to actually adjust those parameters to control all temperature gradients on the growth surface so they remain below 20° C.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

160. ECF No. 97-28 (Ex. 29 to the Long Decl.) is titled “Huron Capital Lender Presentation.” ECF No. 97-28 at CARN-PGD_00115739. It is dated November 7, 2018. *See id.*

RESPONSE: Undisputed.

161. ECF No. 97-28 was prepared to provide high-level information to potential lenders. Ex. 42 (Tsach Dep.) at 163:9-165:2; ECF No. 97-28.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the term “high-level.”

Disputed that the information provided is “high-level.” The undisputed fact is that the CTO of M7D testified: [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

162. ECF No. 97-28 includes [REDACTED]. ECF No. 97-28 at CARN-PGD_00115744-46. [REDACTED]

[REDACTED] *Id.* at CARN-PGD_00115744. ECF No. 97-28 does not address whether the patent enables a person of ordinary skill in the art at the time to “control[] [the] temperature...such that all temperature gradients across the growth surface are less than 20° C.” *See generally id.* at CARN-PGD_00115744-46.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms [REDACTED]

[REDACTED]

Disputed. Yarden Tsach, CTO of M7D and [REDACTED]

[REDACTED]

[REDACTED]. The document speaks for itself. *See* ECF No. 97-28 at 7-9. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

163. ECF No. 97-28 notes additional know-how related to laboratory grown diamonds. *See id.* This additional work is related to scaling up the process claimed in the '078 patent commercial diamond production. *See* ECF No. 97-28 at CARN-PGD_00115744-46; *see also* Ex. 2 (Gleason '078) ¶¶ 81, 292. [REDACTED]

[REDACTED]. *See* ECF No. 97-28 at CARN-PGD_00115746.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms [REDACTED]

[REDACTED]

[REDACTED]

Disputed. The document speaks for itself. *See* ECF No. 97-28 at 7-9. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

164. A person of ordinary skill in the art could practice the invention claimed in the '078 patent without the additional research described in ECF No. 97-20. Ex. 2 (Gleason '078) ¶¶ 81, 292.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “person of ordinary skill in the art,” “additional research,” “the invention claimed in the '078 patent,” and “practice.”

Undisputed and irrelevant. ECF No. 97-20 is U.S. Patent No. 5,318,801, which has no bearing on whether a person skilled in the art could implement a claim contained in the '078 Patent. *See generally* ECF No. 97-20.

165. In 2010, Applied Nanocarbon advised Carnegie that it could not produce a diamond that was “commercially” viability and “colorless.” ECF No. 97-35 at CARN-PGD_00227876.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the terms “advised,” “produce,” and ““commercially’ viability and ‘colorless.’”

Undisputed in part. Undisputed that a portion of the cited text reads, [REDACTED]

[REDACTED]

[REDACTED] The University of Alabama Birmingham originally co-owned the '078 Patent and licensed it to a company called Applied NanoCarbon. Meadows Dep. Tr. 12:3-13:17, 18:10-19:13; *see also generally* ECF No. 97-33. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Disputed to the extent Defendants cannot determine from the cited document whether Applied Nanocarbon communicated with Carnegie.

166. In 2011, Carnegie and Washing Diamond entered a license agreement that included a license to the '078 patent. ECF No. 97-37.

RESPONSE: Undisputed that, following an initial letter agreement [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] ECF No. 97-28 at 8; *see also* ECF No. 97-37 §§ 1.22, 1.26.

167. In 2012, Washington Diamond successfully grew its first diamond. ECF No. 97-36 at CARN-FEN_00135714.

RESPONSE: Undisputed that ECF No. 97-36 at 3 contains a timeline suggesting Washington Diamonds grew its first successful diamond sometime during 2012.

168. In 2013, Washington Diamond sold its first diamond. ECF No. 97-36 at CARN-FEN_00135714.

RESPONSE: Undisputed that ECF No. 97-36 at 3 contains a timeline suggesting Washington Diamonds sold its first diamond sometime during 2013.

2. There are disputed issues of fact as to lack of written description.

169. The '078 patent specification repeatedly describes “controlling the temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are

less than 20° C.,” and provides a POSA substantive means by which to practice this limitation. Ex. 2 (Gleason ’078) ¶¶ 88, 153-201.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “repeatedly,” “describes,” “provides,” “POSA,” “substantive means.”

Undisputed that the ’078 Patent makes more than one reference to the desired goal of maintaining all temperature gradients across the growth surface less than 20° C.

This proposed fact has no impact on the issue of written description, which asks whether the named inventors possessed the full scope of the invention at the time they filed the patent application. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

170. At times, the ’078 patent specification describes the use of a substrate holder that makes thermal contact with the side surfaces of the diamond. Ex. 2 (Gleason ’078) ¶¶ 88; ECF No. 97-1 (’078 patent) at 2:12-24. In other instances, the ’078 patent describes the invention claimed with no reference to thermal contact between the substrate holder and the side surfaces of the diamond. Ex.2 (Gleason ’078) ¶¶ 88; ECF No. 97-1 (’078 patent) at 2:25-3:13, 6:48-7:23, 11:12-31, 12:21-46.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further

object to this proposed fact as ambiguous and vague, specifically the terms “describes,” “use,” “the side surfaces,” “the diamond,” “other instances.”

Disputed for the same reasons discussed above in response to Paragraphs 13, 19, 20, and 134. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

171. A person of ordinary skill in the art reading the '078 patent specification would understand that the inventor possessed methods both with and without thermal contact between the substrate holder and side surfaces. Ex. 2 (Gleason '078) ¶¶ 88, 130-152, 194-201; ECF No. 97-1 ('078 patent) at 2:25-3:13, 6:48-7:23, 11:12-31, 12:21-46.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “person of ordinary skill in the art” and “methods.”

Disputed for the same reasons discussed above in response to Paragraphs 13, 19, 20, and 134. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

3. It is disputed whether low temperatures are adequately described.

172. The asserted claims of the '078 patent do not recite a required oxygen composition. ECF No. 97-1 ('078 patent) at claims 1, 6, 12, 16, 20; Ex 2 (Gleason '078) ¶ 340.

RESPONSE: Undisputed that claims 1, 6, 12, 16, and 20 of the '078 Patent do not affirmatively recite oxygen and irrelevant to written description.

173. Claim 12 of the '078 patent recite a temperature range: 900-1400° C. ECF No. 97-1 ('078 patent) at Claim 12.

RESPONSE: Undisputed claims 12 of the '078 Patent affirmatively recites a temperature range of 900-1400° C.

174. The '078 patent specification describes a temperature range of “about 900-1400° C”: “temperature may be selected from a range of **about 900-1400° C.**” ECF No. 97-1 ('078 patent) at 13:19-27 (emphasis added); Ex. 2 (Gleason '078) ¶ 337.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the term “describes.”

Undisputed that the quoted language appears in the cited document.

175. Example 2 of the '078 patent describes that “[a] high-quality, pure CVD single crystal diamond ... was created ... by adding a small amount (1-3%) of oxygen and lowering the growth temperature to **900 degrees Celsius.**” ECF No. 97-1 ('078 patent) at 14:30-34 (emphasis added); Ex. 2 (Gleason '078) ¶ 338.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the term “describes.”

Undisputed but incomplete. Undisputed that the quoted language appears in the cited document. The entire passage reads: “A high-quality, pure CVD single crystal diamond over 0.6 mm in thickness was created substantially in accordance with the procedure of Example I above by adding a small amount (1-3%) of oxygen and lowering the growth temperature to 900 degrees Celsius. *The added oxygen allows a lower growth temperature*, which removes the nitrogen-related impurities and reduces the silicon and hydrogen impurity levels.” ECF No. 97-1 at 14:30-37 (emphasis added); *see also id.* at Tbl. 1; ECF No. 97-3 at 1; ECF No. 96 ¶¶ 16, 17, 19, 116.

176. Table 1 in the patent lists the results from the process used in one example of the claimed process (described in Example 1). ECF No. 97-1 ('078 patent) at 14:15-26. A person of ordinary skill in the art reviewing the specification of the '078 patent would not understand the results reported in Table 1 would be achieved under different process conditions. Ex. 2 (Gleason

'078) ¶ 341; Ex. 42 (Bachmann-1) at 65; Ex. 43 (Wild) at 375-77; Ex. 44 (Müller-Sebert) at 759-60.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “person of ordinary skill in the art,” “one example,” “claimed process,” “achieved,” “process,” and “different process conditions.”

Undisputed that Table 1 summarizes the crystallinity of “[a] number of MPCVD diamonds [that] were produced according to the guidelines of Example 1 while varying the described process temperature.” ECF No. 97-1 at 14:8-10. “These experiments demonstrate the process temperature ranges for producing various types of diamond in the growth process according [sic] embodiments of the present invention.” *Id.* at 14:10-13. Irrelevant insofar as whether a skilled artisan would have known the results would change by using different process conditions does not speak to whether the '078 Patent describes a way to maintain all temperature gradients on the growth surface below 20° C. while also growing stand-alone diamond with insubstantial non-monocrystalline growth at temperatures below 1000° C. without using oxygen.

177. A person of ordinary skill reviewing the specification would understand that, while oxygen was added to achieve increased growth at a lower temperature, this does not mean that the only way to grow diamond at the low end of the range is by use of oxygen. Ex. 2 (Gleason '078) ¶ 343.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should

be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “person of ordinary skill in the art,” “added,” “increased growth,” and “low end of the range.”

Disputed and irrelevant. Disputed because the '078 Patent does not teach “increased growth at a lower temperature.” The diamond described in the '078 Patent that was grown at a temperature of 900° C. using oxygen was thinner than the diamond grown without oxygen, and it was grown at a slower growth rate. *Compare* ECF No. 97-1 at 14:30-37, *with id.* at 13:57-59; *see also id.* at Tbl. 1; ECF No. 97-3 at 1; Ex. 78 (Capano Notebook) at 1, 6; Ex. 71 (Capano Dep. Tr.) at 76:4-22; *see also id.* at 121:13-23. Irrelevant insofar as whether the only way to grow diamond below 1000° C. is by using oxygen does not speak to whether the '078 Patent describes a way to maintain all temperature gradients on the growth surface below 20° C. while also growing stand-alone diamond with insubstantial non-monocrystalline growth under such conditions.

178. Dr. Hemley testified that the '078 patent does not “rule out” using a temperature below 1000° with a gas chemistry other than that used in Example 1. Ex. 4 (Hemley 9/1/20 Dep.) at 137:12-138:2.

RESPONSE: Disputed in part and irrelevant. Disputed insofar as Dr. Hemley did not mention Example 1 of the '078 Patent. Dr. Hemley testified that it is possible to “get diamond that’s not black and diamond-like carbon at lower temperature” than 1000° C. by changing chemistry. ECF No. 104-4 at 137:12-138:2; *see also* ECF No. 96 ¶¶ 116, 117.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

179. Mr. Tsach testified that he did not think “the temperature range depends on the gas chemistry,” but rather that the patent taught “that both the gas chemistry and the temperature needs to be maintained in certain ranges in order to achieve a diamond growth.” Ex. 42 (Tsach Dep.) at 192:7-12.

RESPONSE: Undisputed.

180. The prior art Hemawan & Hemley-1 reference explained that diamond growth was achieved “in the temperature range of 820-950°C.” Ex. 2 (Gleason ’078) ¶ 344; Ex. 46 (Hemawan & Hemley-1) at 812.

RESPONSE: Disputed in part and irrelevant. The Hemawan & Hemley-1 paper is dated 2017, more than 15 years after the ’078 Patent was filed. Irrelevant insofar as whether it is possible to grow diamond at temperatures in the range of 820-950° C. does not speak to whether the ’078 Patent describes a way to maintain all temperature gradients on the growth surface below 20° C. while also growing stand-alone diamond with insubstantial non-monocrystalline growth at those temperatures.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

181. A person of ordinary skill in the art would have understood the specification to adequately describe the growth of single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface at a temperature of 900-1400° C. Ex. 2 (Gleason ’078) ¶ 345.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further

object to this proposed fact as ambiguous and vague, specifically the terms “person of ordinary skill in the art,” “adequately describe,” “single-crystal diamond,” and “the growth surface.”

Undisputed that a skilled artisan would have understood that the '078 Patent describes an example of growing single-crystal diamond by MPCVD on a growth surface at a temperature of 1220° C. without oxygen and that the '078 Patent describes an example of growing single-crystal diamond by MPCVD on a growth surface at a temperature of 900° C. by adding oxygen.

Undisputed that both of those temperatures are within the range of 900-1400° C.

182. A person of ordinary skill in the art reviewing the '078 patent specification would have understood how and whether to adjust the gas mixture to account for temperature. Ex. 2 (Gleason '078) ¶¶ 341-43; Ex. 43 (Bachmann-1) at 65; Ex. 44 (Wild) at 375-77; Ex. 45 (Müller-Sebert) at 759-60.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “person of ordinary skill in the art,” “adjust the gas mixture,” “how and whether,” and “account for temperature.”

Disputed. For example, around 2005, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano tried “[t]o grow diamonds with parameters as close to the ’078 Patent as possible, and to explore specific departures from the ’078 growth parameters.” Ex. 78 (Capano Notebook) at 1; *see also supra* Response to ¶ 65. When he [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

183. Claims 4 and 7 of the ’078 patent do not depend for independent Claim 12. ECF No. 97-1 (’078 patent) at claims 4, 7, 12.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the term “depend for.”

Undisputed that claims 4 and 7 of the ’078 Patent do not depend from independent claim 12. Also irrelevant.

C. Whether the Asserted Claims of the ’189 Patent Are Indefinite Is Disputed.

184. Claim 1 of the ’189 patent reads:

1. A method to improve the optical clarity of CVD diamond where the CVD diamond is single crystal CVD diamond, by raising the CVD diamond to a set temperature of at least 1500° C. and a pressure of at least 4.0 GPA outside of the diamond stable phase.

ECF No. 97-38 (’189 patent), Claim 1.

RESPONSE: Undisputed that the quoted language appears in the cited document.

185. Dr. Gleason opined on a POSA's understanding of the phrase "outside of the diamond-stable phase" at the time of the '189 patent application:

A person of ordinary skill in the art, at the time the application for the '189 patent was filed, would understand the meaning of "outside of the diamond-stable phase," would have resources available to determine (within the uncertainty permitted in the field of chemistry) what conditions are outside of the diamond-stable phase, and would be able to ascertain the scope of the claims. Skilled artisans would not be at an utter loss to interpret the meaning of that term.

Ex. 3 (Gleason '189) ¶ 210.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a "statement of fact" for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the term "POSA's,"

Disputed in part. Undisputed that the quoted language appears in the cited document. Disputed that a skilled artisan would have been able to understand the claims of the '189 Patent with reasonable certainty. Dr. Gleason testified [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

186. Dr. Gleason further noted:

As Dr. De Weerd notes, the carbon phase diagram had been published by several researchers, including Bundy in 1996 (*Bundy* at Fig. 1). The uncertainty surrounding the precise placement of the phase boundaries would not trouble a person of skill in the art. Theoretical boundaries like this always carry uncertainty, particularly at conditions that are difficult to replicate in real life. A skilled artisan would survey the available literature and make a well-informed determination of the phase boundary and would ascertain within the uncertainty permitted in chemistry whether a particular condition was inside or outside the diamond-stable phase.

Id. ¶ 211.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment.

Disputed in part. Undisputed that the quoted language appears in the cited document. Disputed that a skilled artisan could ascertain within the uncertainty whether a particular condition was inside or outside the diamond-stable phase because the ’189 Patent declined to provide a metric even though it is undisputed there were several competing definitions. *See supra* Response to ¶ 185.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

187. The boundary line between the diamond and graphite phases of carbon was the subject of several scientific studies. *See* Ex. 1(Capano) ¶¶ 380-84; ECF No. 97-53 (Berman-Simon); ECF Nos. 97-49, 97-50 (Bundy); Ex. 10 (Vagarli); Ex. 11 (Strong 380); ECF Nos. 97-55, 97-56 (Day); ECF No. 97-52 (Kennedy & Kennedy); ECF No. 97-51 (Strong 690).

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the term “several.”

Undisputed.

188. There is no imprecision surrounding the scientific definition of the boundary line. The “uncertainty” in the literature is in the thermodynamic and experimental data used to estimate the boundary, leading to some scientific disagreement around the value of certain thermodynamic parameters establishing the boundary line. ECF No. 97-56 (Day) at 59-60.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “scientific definition of the boundary line,” “uncertainty,” “thermodynamic and experimental data,” and “thermodynamic parameters establishing the boundary line.”

Disputed in part. Undisputed that there is scientific disagreement about how to define the location of the diamond-graphite boundary line. Disputed that “[t]here is no imprecision surrounding the scientific definition of the boundary line.” *See* ECF No. 96 ¶¶ 133-39, 143, 144. Moreover, the proposed fact itself is contradictory in that regard. *See supra* Response to ¶ 185.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

189. Dr. Capano determined the “delineation line between graphite and diamond stable phase” based on his review of six references:

[381.] I have reviewed each of the references in the table below to gather an understanding of the analysis in each of the papers. Based on my review of each of the papers and publications listed in the table below, I have determined the slope of the delineation line between the graphite and diamond stable phase for each of the references. Those equations are also in the table below. I have provided the formulas or equations for the temperature in each of kelvin and centigrade as some of the references use kelvin and others use centigrade.

[382.] As shown in the table below, the slope and y intercept for the equation for the Bundy reference is lower than those in each of the other references. This means, that of the references that I reviewed the Bundy reference has the lowest associated pressure with a given temperature for the delineation between the graphite and diamond stable phase.

Reference	Bates number	Formula P (GPa) and T in Kelvin	Formula P (GPa) and T in °C
Berman -Simon	CARN-PGD_ 00163519-524	$P = (0.027 \cdot T + 7.1)/10$	$P = (0.027 \cdot T + 14.47)/10$
Bundy et al.	Misra Ex. 52.	$P = (0.020 \cdot T + 20)/10$	
US Pat. Pub. No.: 2001/0031237 A1 (Vagarali et al.)	Carnegie_189_Defendants-00000815-0823	$P = (0.025 \cdot T + 12.6)/10$	$P = (0.025 \cdot T + 19.4)/10$
US Pat. No. 4,174,380 (Strong)	Carnegie_189_Defendants-00000695-706	Data taken from plot	
K&K preferred line from Day (see Table 1)	CARN-PGD_00163501-511	$P = (0.025 \cdot (T - 273) + 19.4)/10$	$P = (0.025 \cdot T + 19.4)/10$
G&K corrected line from Day (see Table 1, Eq. 4)	CARN-PGD_00163501-511	$P = (0.027 \cdot (T - 273) + 16.5)/10$	$P = (0.027 \cdot T + 16.5)/10$

Ex. 1 (Capano) ¶¶ 381-82.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “determined” and “review.”

Undisputed that the quoted language appears in the cited document. The existence of this opinion does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

190. In the context of discussing the term “diamond stable phase,” Dr. Gleason stated:

The uncertainty surrounding the precise placement of the phase boundaries would not trouble a person of skill in the art. Theoretical boundaries like

this this always carry uncertainty, particularly at conditions that are difficult to replicate in real life. A skilled artisan would survey the available literature and make a well-informed determination of the phase boundary and would ascertain within the uncertainty permitted in chemistry whether a particular condition was inside or outside the diamond-stable phase.

Ex. 3 (Gleason '189) ¶ 211.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment.

Disputed in part. Undisputed that the quoted language appears in the cited document. Disputed that a skilled artisan could ascertain within the uncertainty whether a particular condition was inside or outside the diamond-stable phase because the '189 Patent declined to provide a metric even though it is undisputed there were several competing definitions. *See supra* Responses to ¶¶ 185, 186.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants' favor in the pending summary judgment motion.

191. Dr. Hemley testified:

Q. Okay. So this is the Bundy paper, 1996.

And this R. J. Hemley is you; right?

A. Yes.

Q. And you were a coauthor on this?

A. Yes.

Q. The first sentence in the abstract says, "In recent years, important advances in our understanding of the pressure-temperature phase and transformation diagram for carbon have occurred as a result of developments in both experimental and theoretical techniques." Do you see that?

A. Yes.

Q. Is that true?

A. Yes.

Q. It also says here in the abstract, "This paper focuses primarily on developments since the last review of the carbon phase diagram published in 1989, but also includes references to the older reliable work." Do you see that?

A. Yes.

Q. Do you see here in the first column it says, "The plan for this article is to present the entire phase diagram as we currently understand it and then discuss each part giving the salient references and brief descriptions of the work upon which it is" -- Excuse me. Let me start over.

It says, "The plan for this article is to present the entire phase diagram as we currently understand it and then discuss each part giving the salient references and brief descriptions of the work upon which it is based." Do you see that?

A. Yes. Q. Is that what this article does?

A. Mm-hmm.

Q. Figure 1 says this is a "P,T" -- I assume that means pressure and temperature -- "phase and transition diagram for carbon as understood from experimental observations through 1994"; is that correct?

A. Yes.

Q. And in the text here on the same page under "The Phase and Reaction Diagram," it says, "The topology of stability fields of the thermodynamically stable phases is quite simple: (i) the boundary between the graphite and diamond stable regions which runs from 1.7 GPa/0 K, to the graphite/diamond/liquid triple point at about 12GPa/5000K." Is that referring to this line here?

A. Yes.

Q. Between 5,000 and zero?

A. Yes, yes.

Q. Is that the transition between the diamond and graphite stable regions of the phase diagram?

A. That defines the thermodynamic boundary between graphite and diamond.

Ex. 4 (Hemley 9/1/20 Dep.) at 166:16-168:24.

RESPONSE: Undisputed.

192. Mr. Tsach testified:

7 Again, I do not know why not. To me the
8 understanding of what the sentence of outside of
9 diamond stable phase is -- has ambiguity in it. So
10 I don't know how to answer why not.
11 Q. What's ambiguous about being outside the
12 diamond stable phase?
13 A. The phase diagram that is defining
14 thermodynamically the transition between graphite
15 and diamond by itself is described differently by
16 different people, and also by itself is -- there is
17 a question whether this phase diagram
18 thermodynamically describes the process that is
19 actually happening. So the definition of outside
20 the diamond stable phase is a question of its own.
21 Q. A question of what?
22 A. Of its own. There is -- there is a
1 discussion around what does this mean.

Ex. 42 (Tsach Dep.) at 227:7-228:1

RESPONSE: Undisputed.

193. Dr. Walter testified with regards to published phase diagrams: "There have been a number of determinations of the graphite to diamond stable region over the years. They're all within -- they're all pretty close to each other. ...So each of those approaches to determining that phase boundary will have uncertainties associated with it, and so that particular location, this particular line that's not drawn on this diagram, might shift from publication to publication to some slight degree....It has changed to some degree, but not significantly." ECF No. 97-54 at 205:19-22, 206:12-17, 208:12-13.

RESPONSE: Undisputed but incomplete. Dr. Walter further testified that he estimated the uncertainty in the diamond-graphite boundary to be "maybe plus or minus a half a gigapascal and a hundred degrees Celsius or something like that If you kind of sum together all of the determinations you'd see a band rather than a line." ECF No. 97-54 at 208:5-19.

D. It is Disputed Whether the Asserted Claims of '189 Patent Are Infringed.

194. In his opening report, Dr. De Weerdts cites F.P. Bundy et al., *The Pressure-Temperature Phase and Transformation Diagram for Carbon; Updated Through 1994*, 34 CARBON 141 (1996) (“*Bundy*”). Ex. 47 (Initial Expert Report of Dr. Filip De Weerdts Regarding the Invalidity of Claims 1 and 2 of U.S. Patent No. RE41,189) (“De Weerdts Op. Rep.”) at iii.

RESPONSE: Undisputed that Dr. De Weerdts cites *Bundy*, which was co-authored by two of the named inventors of the '189 Patent—Russell Hemley and Ho-kwang Mao.

195. In his opening report, Dr. De Weerdts cites U.S. Patent Application Pub. No. 2005/0260935 A1 to Anthony et al. (“*Anthony-4*”). *Id.* at v.

RESPONSE: Undisputed.

196. In his opening report, Dr. De Weerdts cites U.S. Patent Application Pub. No. 2001/0031237 to Vagarali et al. (“*Vagarali-1*”). *Id.* at iii.

RESPONSE: Undisputed.

197. In his opening report, Dr. De Weerdts states:

For temperatures and pressures in the shaded region highlighted in the figure above, the '189 Patent does not provide any way for a person of ordinary skill in the art to discern whether those conditions are within the diamond-stable or graphite-stable region of the carbon phase diagram. Although the 1996 Bundy article was the most up-to-date and reliable authority at the time the application for the '189 Patent was filed, *Anthony-4* and *Vagarali-1* both suggest that other definitions, like the one provided in the 1976 Kennedy & Kennedy study, also still persisted at the time, leading to competing standards.

Id. ¶ 269.

RESPONSE: Undisputed.

198. Dr. Capano determined that “at least some of the CVD diamonds annealed by 2A [are] single crystal CVD diamond.” Ex. 1 (Capano) ¶¶ 368-72.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “determined,” “single crystal CVD diamond,” and “at least some.”

Disputed in part. Undisputed that the quoted language appears in the cited document. Disputed for the reasons provided in the Responses to Paragraphs 46 and 47 above with respect to “single crystal CVD diamond.” *See Supra* Response to ¶¶ 46, 47.

This proposed fact has no impact on the issues of this motion for summary judgment. The existence of any dispute in this regard does not preclude the Court from ruling in Defendants’ favor in the pending summary judgment motion.

199. Dr. Capano reviewed each of the following references and thereafter “determined the slope of the delineation line between the graphite and diamond stable phase for each of the references”:

Reference	Bates number	Formula P (GPa) and T in Kelvin	Formula P (GPa) and T in °C
Berman -Simon	CARN-PGD_00163519-524	$P = (0.027 \cdot T + 7.1)/10$	$P = (0.027 \cdot T + 14.47)/10$
Bundy et al.	Misra Ex. 52.	$P = (0.020 \cdot T + 20)/10$	
US Pat. Pub. No.: 2001/0031237 A1 (Vagarali et al.)	Carnegie_189_Defendants-00000815-0823	$P = (0.025 \cdot T + 12.6)/10$	$P = (0.025 \cdot T + 19.4)/10$
US Pat. No. 4,174,380 (Strong)	Carnegie_189_Defendants-00000695-706	Data taken from plot	
K&K preferred line from Day (see Table 1)	CARN-PGD_00163501-511	$P = (0.025 \cdot (T - 273) + 19.4)/10$	$P = (0.025 \cdot T + 19.4)/10$
G&K corrected line from Day (see Table 1, Eq. 4)	CARN-PGD_00163501-511	$P = (0.027 \cdot (T - 273) + 16.5)/10$	$P = (0.027 \cdot T + 16.5)/10$

Ex. 1 (Capano) ¶ 382.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the term “determined.”

Undisputed that the quoted language appears in the cited document.

200. Based on his analysis, Dr. Capano determined that the specific pressures and temperatures used in 2A’s annealing process fall within the ’189 patent’s claims. *Id.* ¶¶ 373-400.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “analysis,” “determined,” “specific pressures and temperatures used in 2A’s annealing process,” and “fall within the ’189 patent’s claims.”

Disputed in part. Undisputed that Dr. Capano chose a particular definition of the diamond-graphite boundary to apply. Disputed as to whether his analysis and conclusions are correct. Dr. Capano has no experience with HPHT diamond annealing or HPHT annealing of any kind. Ex. 71 (Capano Dep. Tr.) at 30:4-31:14. The ’189 Patent provides no definition or guidance regarding the proper definition of the diamond-graphite boundary as understood by the named inventors. *See generally* ECF No. 97-38. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dr. Capano applies a definition of the

diamond-graphite boundary provided in a paper authored in 2012, over a decade after the application for the '189 Patent was originally filed. ECF No. 96 ¶¶ 140-42. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

201. Dr. Capano was also able to determine that diamonds annealed by 2A are annealed within the graphite stable phase (i.e., outside the diamond stable phase). *Id.* ¶¶ 387-91.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “determine,” “graphite stable phase,” “diamonds annealed by 2A,” and “diamond stable phase.”

Disputed in part. Undisputed that Dr. Capano provides an opinion that 2AT infringes the '189 Patent. Disputed as to whether his analysis and conclusions are correct for the reasons stated in response to Paragraph 200 above. *See supra* Response to ¶ 200. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

202. Dr. Capano ultimately determined that 2A's annealing processes infringe the asserted claims. *Id.* ¶¶ 373-402.

RESPONSE: Defendants object to this purported statement of fact as not an actual fact but rather a conclusion of law, restatement of expert opinion, and/or argumentative. None should be considered a “statement of fact” for purposes of summary judgment. Defendants further object to this proposed fact as ambiguous and vague, specifically the terms “ultimately determined” and “2A's annealing processes.”

Disputed in part. Undisputed that Dr. Capano provides an opinion that 2AT infringes the '189 Patent. Disputed as to whether his analysis and conclusions are correct for the reasons

stated in response to Paragraphs 200 and 201 above. *See supra* Response to ¶¶ 200, 201. This dispute does not create a genuine issue of material fact that the jury needs to resolve.

203. Regarding the carbon phase diagrams in the scientific literature, Dr. Walter testified that “there’s no gold standard” and researchers “look at each of the individual determinations in detail to make an assertion about how much you -- how much uncertainty were involved in those experiments.” ECF No. 97-54 at 207:1-7.

RESPONSE: Defendants object to this proposed fact as ambiguous and vague, specifically the terms “carbon phase diagrams in the scientific literature.”

Undisputed but incomplete. Dr. Walter further testified that he estimated the uncertainty in the diamond-graphite boundary to be “maybe plus or minus a half a gigapascal and a hundred degrees Celsius or something like that If you kind of sum together all of the determinations you’d see a band rather than a line.” ECF No. 97-54 at 208:5-19.

Dated: November 4, 2020

Respectfully submitted,

s/ William P. Deni, Jr.

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